# The Mysore Economic Journal

A Monthly Periodical devoted to the Discussion
of all Economic Topics of Interest

*PUBLISHED UNDER THE AUSPICES OF THE MYSORE ECONOMIC CONFERENCE*

VOL. V — NOVEMBER 1919 — No. 11

## EDUCATION FOR CITIZENSHIP.

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FOUR years ago few people could have been found to prophesy that one of the results of a war unexampled in scale, horror and destructiveness would be the quiet concession to women of a large first instalment of that parliamentary suffrage which they had so long vainly demanded. "Nothing happens but the unforeseen" say our witty neighbours and allies, and the manner, if not the fact, of this happening justifies the pithy saying.

Many of us women have now—more will soon have—the long coveted right which makes us full citizens of our country and Empire. Let us realise what this means. It means that six million women voters—nearly one-third of the total number of parliamentary voters in these Islands—will take part in the election of the next Parliament—that women if they do not fail to use their votes punctually and intelligently can have a very considerable share in determining the sort of Government we shall have in the future, the kind of measures which will be passed through Parliament, and therefore, to some extent, the sort of world in which we shall all be living. Moreover, we may expect that extensions of the franchise will follow somewhat rapidly so that most of us now living may see the day when women will have realised the aim of the suffragist leaders and enjoy the parliamentary suffrage "on the same conditions on which it is, or may be, granted to men."

Now it is obvious that a great power is being committed to the hands of women and it is for them to show that they can exercise it worthily. It will not do for women to put their responsibilities upon others and to adopt without examination the views of either their male relatives and friends or of other women with more intellectual activity and more social zeal than themselves. Those who are satisfied to vote for other people's opinions, which they have not by enquiry and reflection made their own, are not discharging adequately their new trust. The first duty of a good citizen is to inform herself about her country—to learn about its past history and its present position. "Stands England where she did ?" is a question we ought all to be qualified to answer, and we want to be assured that not only does she still stand for all that was best and noblest in her past but that she is moving forward in the front line of progress, hand in hand with the other great nations which, with her, are fighting the battle for human liberty.

The first essential for citizenship is education—we cannot *serve* if we do not *know.*

Education for citizenship begins as soon as a child is old enough to realise that she must not, in order to gratify herself, do what will hurt others. That is the first stirring of the feeling of "community" the "social" spirit—and a wise mother or teacher will steadily develop in the child the idea that she must refrain from doing what is contrary to, and do what will promote the good of the group of which she is a member—first the family, then the school, then the nation. Women have often in the past been accused of lack of this "community" feeling, and while it has been granted that they are very generally unselfish in their devotion to husband and children, they have been reproached with a want of that larger unselfishness which refuses to accept advantage, personal or family, at the cost of injury to the community. Food hoarding and food grabbing, for example, would have been rarer in recent times if the sense of citizenship had been stronger.

The next step in education for citizenship should be the awakening of a sense of responsibility. We are citizens of a great democratic state—that is of a state which has adopted the principle of Government *of* the people *by* the people *for* the people. It is we citizens and no others who are responsible for its good government, for its institutions good and bad, for the condition of the masses of its people, for the execution of its laws. It has no rulers that we, its citizens cannot, if we exert ourselves, both make and unmake, no institutions that we cannot mend or end, no laws that we cannot replace by others. These powers constitute a tremendous responsibility which we, if we are good citizens, must recognise and bear and for this we need above all education. We cannot judge a government until we understand the manner in which it is set up and the way in which it is administered. We cannot understand the value of an institution till we know the purpose which it is intended to serve and the measure in which it fulfils that purpose. We cannot estimate our rulers fairly if we are too careless and indifferent to enquire into their qualifications and examine their record.

Now the best preparation for carrying out this great task of government which is laid upon each citizen of a democratic state is to learn to govern herself. Parents and schools alike have, I think, much to do in developing among their children the power of self-government. In the past schools have relied greatly upon rules and punishments for those who broke them. Too often both in the family and in the school it was thought unnecessary to explain the reason and the justification of the rules to those who were expected to obey them and the result has been too often resentment and disobedience. The willing obedience which often follows an appeal to reason and judgment had no chance to exist. There is no finer virtue than obedience but the self-respecting obedience of the free man is a far nobler thing than the cowed submission of the slave. Let us call the reason of our child into counsel; let us try to make them understand the nobility that lies in checking the lawless impulse, in laying down voluntarily for the common good a portion of our freedom, in following loyally the appointed leader. "It is a fine thing" says the writer who drew for us the 'Beloved Captain' "when men trust their leader and will follow him anywhere, but it is a still finer thing when they will stand by any leader whether they know him or not, and this last is the fruit of perfect discipline."

Then having learnt the lesson of self-discipline our young people may be trusted with a large share in their own government. A great deal of the license and lawlessness which we deplore in these days is a reaction against over-government. Our "citizens to be" to whom such powers will be committed, need our counsel and our guidance, but coercion should be as rare as is consistent with their safety, and, after reason is

developed, *blind* obedience should not be expected. Schools should be far bolder in trying experiments in self-government by their pupils and fertile in plans for rousing in them interest in everything that concerns the welfare of their village, town, county, and ultimately of their country and Empire. Associated with the work in schools should be visits to public institutions and to the meetings of public bodies where future citizens can learn something of the nature of civic duties and the qualifications required for their discharge. Debates and discussions on matters affecting the public welfare should be frequent. Citizens' Associations in every town and district might be made a most powerful means of awakening intelligent interest and supplying useful information in civic affairs. It should be the concern of all wise parents, as of all enlightened educators, to see to it that nothing which affects the good of the community should seem apart from, or uninteresting to those, in whose hands will lie, when they themselves have pessed away, the government of that great and goodly Imperial heritage the establishment of which is both the highest achievement and the heaviest responsibility of our race.

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Three were 44 mills on the list of the Japan Cotton Spinners Association in the month of June, 1919, having 3,185,000 spindles, and they produced 7,964,000 kwans of yarn of various counts, the average count being 2·4, consuming for the purpose 79,35,000 kwans of cotton and 130,000 of cogl, and employing 31,400 male and 101,000 female work people. The actual horse-power used in manufacture was 65,560.

## CO-OPERATION IN BOMBAY, 1917-18.

By "Rusticus."

THERE is always so much of value to co-operators all over India in Mr. Ewbank's Report on the working of his Department in Bombay that even the fact that he has, in all probability, by this time submitted to his Local Government a Report for 1918-19 would not be sufficient justification for an omission on our part to review his Report for the previous year. It is difficult to fathom the reasons for the Bombay Government's attitude in this matter. If they are so overwhelmed with work that it is impossible for them to issue a review of the Report for some eight or nine months after it reaches them, they might at least allow it to be given to the general public in advance of their review.

Mr. Ewbank commences his Report with some interesting remarks on its arrangement. He mentions that, in previous years, he started by giving an account of the Provincial Bank and that, after dealing with central banks and unions, he came down, at last, to primary societies and treated supervision, audit and propaganda as entirely separate heads. As he says, this arrangement tended to throw the whole system into a false perspective and to magnify the functions of financing, controlling or supervising agencies at the expense of the village society. It must never be forgotten that the object for the benefit of which the whole fabric has been constructed is the village society and that the success of the movement can be gauged by no other criterion than the number of healthy, independent and successful primary societies it has created. Mr. Ewbank has, therefore, reversed the previous arrangement and, in the Report under review, places the working of the primary societies in the

forefront. That, as our readers may have noticed, has been our invariable practice in reviewing the progress of the co-operative movement in the different provinces.

1917-18 can only be regarded as a moderately good year in Bombay from a co-operative point of view. The *kharif* (monsoon) crops were poor in parts of North Gujarat and the Deccan and the cotton crop was much below the average in Khandesh. The prices of agricultural produce ruled very high but the congestion of traffic on the railways made it exceedingly difficult to move it. Plague was exceptionally severe all over the Presidency and brought the working of many co-operative societies to a standstill. Although wages rose substantially in the towns, the rise did not keep pace with the rapid increase in the cost of all necessaries of life and the margin of earnings available for repaying loans to co-operative societies shrank. None the less, solid progress was made during the year. The number of societies increased from 1,307 to 1,650, the number of members from 130,903 to 156,805 and the working capital from Rs. 123.21 lakhs to Rs. 162.88 lakhs.

Of the 1,650 societies in Bombay, 1,319 are agricultural credit societies with unlimited liability and it is, therefore, by the condition of these societies, above all others, that the condition of the movement must be judged. The Report is full of evidence that there is every reason to regard it as satisfactory. The average membership of societies declined from 75 to 73 which is all to the good and the average sum available per head rose from Rs. 65 to Rs. 71. The reserve fund increased from Rs. 3.19 lakhs to Rs. 4.33 lakhs. Most satisfactory of all, although the total amount outstanding on loan at the end of the year was Rs. 64.88 lakhs, only Rs. 4.68 lakhs or 7 per cent of this was overdue. Mr. Ewbank and his staff are much to be congratulated on these figures. Authorized extensions granted to members by managing committees are not included in the total but, even so, they show that the state of the collections in Bombay presents none of the disquieting features revealed by recent Reports from other parts of India. Mr. Ewbank gives a very interesting analysis of the objects for which loans have been granted. 66 per cent were for current agricultural expenses, purchase of cattle and implements, land improvement and payment of land revenue and irrigation dues. Buildings and repairs account for three per cent, domestic expenses for five per cent and trade for another five per cent. Redemption of debt accounts for 18 per cent or Rs. 11.50 lakhs, an amount which Mr. Ewbank confesses considerably surprised him as central banks have been very chary of giving loans for liquidating old debts, partly because they are always required for long periods and partly because the security is often suspect. He concludes that societies have taken matters into their own hands and used their deposit capital to a greater extent than had been supposed for the liquidation of debts. The percentage of loans granted for domestic expenses such as funerals and weddings is certainly not too high whilst the fact that Rs. 2.97 lakhs were advanced for the payment of land revenue and irrigation dues does not mean that the members of societies were unable to pay these without borrowing but that they are learning to hold up their stocks on a rising market for better prices. This is a very sound policy provided they do not hold them up too long. We agree with Mr. Ewbank in thinking that the statement shows that working capital is being handled wisely and devoted to proper objects in reasonable proportions.

The rapid multiplication of communal societies is perhaps the most interesting feature of the working of non-agricultural credit societies. Mr. Ewbank regards this as evidence that the caste system seems to be as firmly rooted as ever and holds that the best course is to accept it as a basic fact of

society and to make use of it as far as possible for extending co-operation. The biggest of the communal societies is the Shamrao Vithal Society of the Kanara Sarasvat Brahmans which has a working capital of Rs. 3'80 lakhs but, big as it is, it is a small affair compared with the G. I. P. Railway Society with its capital of Rs. 13.55 lakhs. We are sorry to see that the enthusiasm which started societies for debt redemption amongst the mill-hands of Bombay, from which great things were expected, has died down and that many of the societies are now in a parlous state. Mr. Ewbank considers that experience has shown that debt redemption should not be undertaken at the outset but only after a society has worked for some time and as a reward to those members who have proved themselves punctual and thrifty. The Social Service League is now forming societies amongst the mill-hands on this principle. Societies exclusively confined to the depressed classes in Bombay have never done well and are gradually being wound up. Madras has done much better in this respect for, there, such societies are numerous and flourishing, largely owing to the interest taken in them by Chairmen of Municipal Councils, Secretaries of the Young Men's Christian Association and the Fisheries Department.

The organization of agricultural non-credit societies has been a special feature of co-operative work in Bombay since the passing of the Act of 1912, and "Co-operation in agriculture" has made greater progress in that Province than in any other. In 1917-18, the twenty-one manure purchase societies bought over 8½ million pounds of manure, mostly castor, ground-nut and safflower cake. The four cotton sale societies in Dharwar sold 90,700 maunds of cotton of 28 pounds each and the four in East Khandesh, 12,654 cart loads. Other sale societies did even better. The Baramati Society sold over 4½ million pounds of jaggery and the Nira Society over a million pounds. It is only fair to mention, however, that the depôts for the sale of jaggery produced by these societies are managed by the agents of the Bombay Central Bank. The Islampur Society which has no such assistance sold nearly a million pounds of jaggery and ground-nut and that at Shenoli over half a million pounds of jaggery, ground-nut and turmeric. Eight seed societies were started in Khandesh in 1917, with the object of obtaining seed of the *roseum* variety of cotton from the Government farms, growing it through the agency of registered growers and distributing the seed so produced in the second generation to their members. The unfavourable season handicapped the experiment and the seed society at Gadag which disposed of Dharwar American, Cambodia and *kumpta* seed was much more successful. The number of societies specially devoted to the ownership of agricultural implements to be let out on hire increased to ten. Five of these owned iron ploughs, three an oil-engine and cane-crusher and two a cane-crusher only. Mr. Ewbank attributes the increase in this class of society to the growing scarcity and cost of labour which makes labour-saving machinery a necessity and also to the fact that, owing to the high prices of produce, agriculturists have more money to invest. The ten cattle breeding societies were fairly successful. As this is a somewhat uncommon type of society, its working merits a brief description. The aim is to gather a herd of about sixty cows, to obtain a separate grazing area and to own a breeding bull. The herdsman daily drives the cows out from their different homes accompanied by the bull to the pasture, keeps off other bulls, notes all coverings and maintains a herd book. The obstacles to a rapid increase in the number of these societies are the difficulty and expense of procuring good bulls and the necessity for securing separate grazing areas. Mr. Ewbank mentions that recommendations for grants-in-aid have been submitted to Government. We trust that

they will be accepted for an improvement in the breed of cattle is a matter of more than local importance. The four cattle insurance societies only started work in 1917-18 and the eleven dairies made little progress during the year.

As for other non-credit societies, the housing societies in Bombay are doing exceedingly good work and seem to be solving the problem of house room in that exceedingly congested city so far as their members are concerned. The Saraswat Housing Society erected five handsome buildings accommodating forty-two families at a cost of Rs. 1½ lakhs. Weavers' Societies in Bombay appear to be rather more hopeful than they are elsewhere but we trust that the improvement recorded by Mr. Ewbank in 1917-18, was not a flash in the pan due to the abnormally high price of cloth prevailing in 1918. The formation of a Union of ten Weavers' Societies at Dharwar for the wholesale purchase of yarn was a stop in the right direction.

The working of the central banks and of the Bombay Provincial Bank calls for little comment. The large increase in the working capital of the former shows that they are successfully fulfilling one of their main objects, that of broaching new sources of finance at the larger centres in the mofussil. The gnaranteeing unions in Bombay are a recent development. There are now 31 of them with 179 affiliated societies. Mr. Ewbank explains that they would be much more numerous were it not that, in the past, societies in the Bombay Presidency were sprinkled about broadcast and are, consequently, not situated in groups suitable for combination into unions. Progress will be more rapid in future as attention is now being directed towards forming new societies round specially good old ones so that, as soon as they become firmly established, unions may be registered. But Mr. Ewbank points out that unions have so much to learn before they can be trusted to operate large cash credits from a central bank that it is essential to move cautiously and to train the committee carefully in their duties before allowing them to start work.

The amount of work which is done by voluntary effort in Bombay is very marked and is gratifying evidence of Mr. Ewbank's own enthusiasm and tact for, in securing voluntary workers, everything depends upon the personality of the Registrar. Each district has a staff of Honorary Organizers and Assistant Honorary Organizers and, except in the case of non-credit societies, all new societies are formed and supervised by unpaid non-official effort. Bombay has its Central Co-operative Library, also rnn by voluntary agency under the chairmanship of Mr. Lalubhai Samuldas, a well-known figure in the co-operative world, and, since the close of the year under review, has a Central Co-operative Institute. The Committee of the library issue the Bombay Co-operative Quarterly and we entirely endorse Mr. Ewbank's high praise of that journal, which is a model of what a co-operative periodical should be. It is satisfactory to learn that its circulation is such as to make it self-supporting. The success of the Co-operative Secretaries Training Class, the holding of a Provincial Co-operative Conference and of six local conferences and the propaganda work of the Co-operative Housing Association are all additional evidence that co-operation in Bombay is very much alive and is playing an increasing part in the life of the Presidency.

# AGRICULTURAL PRODUCTION IN GERMANY BEFORE THE WAR.

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THE enormous increase in agricultural production in Germany during the last 25 years preceding the war was quite unparalelled in her history. This increase which began in 1879, soon after the introduction of protective tariffs by Bismarck was temporarily interrupted through the weakening of this policy by Caprivi, but the progress commenced again soon after the return to the old policy of Bismarck.

The increase in yield per acre of all the principal crops from 1885-86 to 1912-13 was as follows :—

| Crop | Yield per acre in cwts. | |
|---|---|---|
| | 1885-86 | 1912-13 |
| Rye ... ... | 9·44 | 14·80 |
| Wheat ... ... | 12·08 | 18·10 |
| Barley ... ... | 12·00 | 17·52 |
| Oats ... ... | 11·30 | 15·52 |
| Potatoes ... ... | 81·44 | 120·26 |
| Meadow Hay ... | 26·16 | 37·36 |

In addition to this increase in yield per acre, the increase in area under each crop was as follows :—

| Crop | Area cultivated in acres | |
|---|---|---|
| | 1885 | 1913 |
| Rye ... ... | 14,569,600 | 16,035,375 |
| Wheat ... ... | 4,822,650 | 4,935,250 |
| Barley ... ... | 4,556,550 | 4,134,500 |
| Oats ... ... | 9,561,300 | 11,095,375 |
| Potatoes ... ... | 7,296,500 | 8,530,100 |
| Meadows ... ... | 14,771,300 | 14,808,500 |

From the above two tables we see that the increase in yield per acre has been accompanied by an increase in the area under each crop also. In fact the total increase in area under grain crop was about 1,750,000 acres. The increase in the total grain crop produced was about eight million tons, thus giving an average increase of four cwts. per acre.

A comparison of the two periods 1885-89 and 1908-1912 is shown below :—

| Crop | Total produce in tons. | | |
|---|---|---|---|
| | 1885-89 | 1908-12 | Increase per cent |
| Wheat ... | 2,913,882 | 3,962,390 | 36·0 |
| Rye ... | 6,890,588 | 11,012,170 | 59·8 |
| Barley ... | 2,619,559 | 3,220,066 | 22·9 |
| Oats ... | 5,411,131 | 8,189,062 | 51·3 |
| Potatoes ... | 29,705,780 | 44,220,213 | 48·9 |
| Hay ... | 19,336,392 | 25,024,472 | 29·4 |

These figures for the increase in crop bear ample testimony for the good work done by German Agriculture during the period under consideration. A comparison with the period 1908-12 is not very favourable, for 1911, the

year of drought which in many parts of Germany decreased the yield enormously falls during this period.

In addition to the above comparisons which show us the increase in acreage and yield per acre, we have now to find out whether the increase has kept pace with the increase in population during the same period. The population rose from 47,925,000 in 1885-90 to 65,866,000 in 1911-12. During the above period the annual consumption of Rye per head of population increased from 135·2 kg. to 140·1 kg. and that of wheat from 69·3 kg. to 87·6 kg. Here we see that the consumption of wheat has increased enormously, and this demand could only be met by increasing imports which rose from 305,293 tons in 1885-90 to 1,682,317 tons in 1911-12. Only with regard to Rye, Germany had an increase for purposes of export. In fact instead of the import of 577,425 tons in 1885-90, she had an export of 613,308 tons in 1911-12 in spite of the increase in home consumption. The necessity for import of wheat owing to increased consumption per head of population was also decreasing gradually. During the period 1906-10 it amounted to about 33·81 per cent, in 1911-12 to 29·21 per cent of its consumption. Experiments were in progress to put an end during the next decade even to this import by breeding suitable kinds of wheat which could give high enough yields even on light soils exposed to rough weather. The only fear of not realising their expectations was about some unfavourable alteration in the legislation, lack of labour, war or some other unforeseen event.

Under other field crops, the increase in the yield of potatoes was so enormous that it became almost a calamity in 1912. This increase was of very great economic importance. Through the further development of the drying industry, this increased crop was to be made to serve to supply the deficit in bread corn and to replace the barley used for feeding animals and thereby save to the country a sum of twenty million pounds which was being paid for the imported wheat and barley. A beginning in the direction had already been made, the necessary methods and apparatus were there and it only required some improvements in the details of it. Through continuous progress in these lines, it was hoped to save fifty million pounds paid for imported concentrated feeds from abroad.

Only with regard to oats was very little variation with regard to the imports. During the years 1885-90 only 3·40 per cent of the consumed quantity was imported, and in 1911-12 it was still 3·33 per cent of it. This shows that production has kept pace with increase in population. Through further intensive cultivation, and making arable vast stretches of moor and heath lands, it was hoped not only to satisfy the Home demand in the near future but also to develop an export trade in it. Besides there was the possibility of substituting potatoes for feeding purposes and dispense with the imported oats.

Only with regard to barley, there was very little probability of satisfying the demand through Home production. 18·57 per cent of consumption was imported in 1885-90 but 53·28 per cent in 1911-12. As most of the imported barley was for purposes of feeding animals, it was hoped to substitute potatoes for it.

This short review of the production of German agriculture shows us that so far as the nutrition of people and animals was concerned, the production has partly kept pace with increase in population and partly exceeded it. There was a deficit only with regard to wheat and barley and ways and means were under consideration to supply the deficit through increased production during the next decade.

The development of animal production in Germany also shows considerable progress

during this period as seen by the following table.

| Animal | Number of millions 1883 | Number of millions 1912 |
|---|---|---|
| Horses ... ... | 4·50 | 4·50 |
| Cattle ... ... | 15·75 | 20·25 |
| Pigs ... ... | 9·25 | 22·00 |
| Goats ... ... | 2·50 | 3·33 |

In contrast to the above increase, is the decrease in the number of sheep which fell from 19 millions in 1883 to 5·75 millions in 1912.

The number of animals maintained on farms of different sizes is not quite uniform. The largest number of horses, cattle and pigs is to be found on holdings ranging in extent from 5 to 250 acres, whereas goats and poultry are abundant in holdings under five acres in extent. The maintenance of sheep is strongest on holdings of more than 50 acres in size.

On the distribution of animals on holdings of various sizes the following statement gives information:—

| Size of holding | Horses | | Cows | | Sheep | | Pigs | | Goats | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Actual number | Percentage of total | Actual number | Percentage | Actual number | Per cent | Actual number | Per cent | Actual number | Per cent |
| Under 5 acres ... | 71,369 | 2·05 | 1,026,529 | 9·93 | 415,750 | 4·66 | 4,383,244 | 23·23 | 2,697,206 | 73·8 |
| Between 5 and 250 acres ... | 2,767,102 | 79·26 | 8,305,477 | 80·32 | 4,134,746 | 46·34 | 13,096,402 | 69·42 | 948,388 | 25·9 |
| 250 acres and more ... | 652,536 | 18·69 | 1,007,959 | 9·75 | 4,371,103 | 49·00 | 1,386,272 | 7·35 | 8,314 | 0·2 |
| Total ... | 3,491,007 | 100 | 10,339,965 | 100 | 8,921,599 | 100 | 18,865,918 | 100 | 3,653,908 | 100 |

Besides 96 to 98 per-cent of all poultry in the country is maintained on farms less than 250 acres in extent. Considering the size of a farm and the animals maintained on it, it is also clear from the table that the smaller farms maintain a larger number of animals than the bigger ones. The following table gives the number of animals maintained in Prussia on each unit of area utilised for agricultural purposes on the various sizes of farms:—

| | Horses | Cattle | Sheep | Pigs | Goats | Poultry |
|---|---|---|---|---|---|---|
| 1. Small holdings under 1½ acres. | | | | | | |
| 1895 ... ... | 4 | 82 | 74 | 505 | 386 | ... |
| 1907 ... ... | 2 | 66 (60) | 60 | 662 | 387 | 3,080 |
| 2. Holdings between ½ and 5 acres. | | | | | | |
| 1882 ... ... | 3 | 90 | 50 | 137 | 122 | ... |
| 1895 ... ... | 6 | 80 | 28 | 164 | 90 | ... |
| 1907 ... ... | 5 | 81 (62) | 19 | 214 | 106 | 993 |
| 3. Holdings between 5 to 12½ acres. | | | | | | |
| 1882 ... ... | 7 | 77 | 27 | 51 | 8 | ... |
| 1895 ... ... | 8 | 78 | 17 | 83 | 10 | ... |
| 1907 ... ... | 9 | 90 (58) | 12 | 115 | 14 | 473 |
| 4. Holdings between 12½ to 50 acres. | | | | | | |
| 1882 ... ... | 14 | 52 | 33 | 29 | 2 | ... |
| 1895 ... ... | 14 | 56 | 21 | 49 | 2 | ... |
| 1907 ... ... | 15 | 69 (36) | 14 | 70 | 4 | 277 |
| 5. Holdings between 50 and 250 acres | | | | | | |
| 1882 ... ... | 12 | 38 | 60 | 17 | 0·4 | ... |
| 1895 ... ... | 13 | 43 | 37 | 27 | 0·5 | ... |
| 1907 ... ... | 13 | 53 (22) | 25 | 40 | 0·9 | 150 |
| 6. Larger than 250 acres. | | | | | | |
| 1882 ... ... | 7 | 19 | 148 | 6 | 0·06 | ... |
| 1895 ... ... | 8 | 25 | 76 | 10 | 0·10 | ... |
| 1907 ... ... | 9 | 33 (14) | 58 | 19 | 0·30 | 49 |
| 7. Larger than 500 acres. | | | | | | |
| 1882 ... ... | 7 | 17 | 157 | 5 | 0·05 | ... |
| 1895 ... ... | 8 | 23 | 82 | 10 | 0·07 | ... |
| 1907 ... ... | 9 | 31 (12) | 65 | 17 | 0·08 | 40 |

*N. B.*—The figures in brackets show the number of cows maintained for milking purposes.

The above figures show also the relative increase in the number of animals of all kinds since 1882. They also bring out the fact that more horses are maintained per unit of area in holdings ranging between 12½ and 250 acres in size than in the other ones. The number of cattle maintained per unit of area is largest in holdings between 1½ and 12½ acres, sheep on the large sized holdings, whereas pigs, goats and poultry are abundant on the smaller holdings varying from 1½ to 5 acres in size.

The largest number of animals maintained per unit of area and consequently the largest quantity of meat produced is thus to be found on small holdings, but with regard to the quality of the animals maintained and meat produced the larger farms take the lead. This is probably due to the better stabling and feeding conditions possible on the big estates.

It is very improbable that the big farms can ever maintain the same number of animals per unit area as the smaller ones. For the breeding of young animals through individual attention and care, the smaller forms are decidedly at an advantage. The work of an energetic, intelligent and careful wife of a small farmer who actually loves the animals under her care cannot be well substituted by paid labonr upon whom the big farmers are dependent for that kind of work.

With regard to stock-breeding, all farms-big or small—have the same interest at heart, and there is a very good division of labour between the two. The small farms usually maintain good female animals for breeding purposes. When the young ones have become independent of the mother, the bigger farmers purchase such animals and allow them to grow furtber or fatten in their estates. In horse breeding for example, many of the valuable mares are in possession of small farmers who can attend to them personally whereas a big farmer with his paid servants runs a great risk in maintaining them. On the other hand the small farms do not possess the necessary pasture for the young animals to roam about and develop their muscles and tendons normally.

Let us now consider the agricultural technical industries such as sugar-making, distillation of spirits, manufacture of starch, etc. These technical industries not only get their raw materials from agriculture, but also give their waste and bye-products in the form of feeding stuffs or manures back to Agriculture. Those waste and bye-products cannot be utilized otherwise at all. In this way all the mineral constituents which the plants had taken up from the soil and a part of the nitrogen is again returned to the land while the main products—sugar, alcohol and starch-built up of the elements of the atmosphere are exported out of the estates.

These industries so intimately connected with agricultural production, stimulate it to a great extent. The production of such crops as sugar beets and potatoes required a very careful cultivation, manuring, seed selection and consequently a good foundation was laid for intensive cultivation.

The other technical industries such as beer-brewing, milling and baking, even though they have a connection with agriculture in working up the raw agricultural produce while their waste and bye-products are ordinary objects of commerce, are not dependent on any particular agricultural area for the establishment of the necessary factories.

The cultivation of the sugar beet in Germany increased from 923,120 acres in 1889 to 1,261,850 acres in 1911 while the number of sugar factories decreased from 403 to 340. The quantity of beets worked up during the same period rose from 10 to 15·75 million tons and the molasses produced from 254,000 to 328,000 tons. The yield of beets per acre varied from 12 to 13 tons but went down to 7 tons in 1911, the year of severe drought. The production of raw sugar itself was as follows:—

| | | |
|---|---|---|
| 1881-1892 | Average per year | 1,099,549 tons |
| 1892-1897 | do | 1,506,344 ,, |
| 1897-1902 | do | 1,826,125 ,, |
| 1902-1907 | do | 1,876,889 ,, |
| 1907-1912 | do | 1,973,802 ,, |

The following table gives some idea of the improvements on the manufacturing side.

| | | |
|---|---|---|
| 1884-89 | one cwt of beets yielded | 12·91 lbs. sugar. |
| 1889-94 | do | 12·91 ,, |
| 1894-99 | do | 14·09 ,, |
| 1899-04 | do | 15·43 ,, |
| 1904-09 | do | 16·74 ,, |
| 1910 | do | 16·62 ,, |
| 1911 | do | 17·36 ,, |
| 1912 | do | 17·20 ,, |

These figures clearly show the effect of intensive culture and manuring, the perfection of the manufacturing process as also the effect of plant-breeding in producing a beet with a high sugar content. If the beet itself had not actually been made richer in sugar, it could not have been possible for the factories to get a larger amount of sugar out of the same weight of beets in spite of their perfection of manufacturing machinery.

The decrease in the number of factories is not to be interpreted as a decline of the industry. The explanation for this phenomena is that the smaller ones could not stand the competition with the better organized bigger ones, and had to make way for them consequently. At any rate Germany produced in 1912 nearly twice the quantity of sugar she did before 25 years, and during the same period the average sugar-content of the beet itself rose from 12·51 per cent to 15·67 per cent, *i.e.*, an increase of 25·3 per cent.

The disposal of this enormous production of sugar had its own difficulties. Owing to increased production and protective tariffs of the other countries, the export of German sugar gradually went down, and during 1907-12, only 40 per cent of the sugar produced could be exported. Luckily, the tax on the beets was first reduced 50 per cent and then completely abolished in 1892. In its place a tax was levied on manufactured sugar, and the annual consumption also rose from 20·35 lbs. to 43·31 lbs. per head of population.

That there is a great probability of more sugar being consumed in the country itself is seen from the following table:—

| Country. | Annual consumption of sugar in lbs. per head of population |
|---|---|
| 1. England | 92 |
| 2. North America | 83 |
| 3. Denmark | 77 |
| 4. Switzerland | 55 |
| 5. Sweeden and Norway | 46 |
| 6. Germany | 43 |
| 7. Holland | 41 |
| 8. France | 34·5 |
| 9. Belgium | 31 |
| 10. Austria | 24 |

Germany stands sixth in the above table. By further decreasing the tax on the manufactured sugar, it was expected that more of it would be consumed in the country itself thus freeing her from the anxieties of export and making her independent of foreign markets for the sugar produced.

Of the industries dependent on potatoes as raw material, the manufacture of spirits stands first on the list. Only about 10 per cent of the potato crop is used up by the industries connected with it, and the major part of the crop is consumed by human beings and animals. The distribution of the annual crop of 45 million tons was as follows:—

| | | |
|---|---|---|
| 16·3 | million tons | for feeding animals. |
| 13·0 | ,, | for human consumption. |
| 6·6 | ,, | for seed purposes. |
| 4·6 | ,, | for industrial purposes. |
| 4·5 | ,, | lost during storage. |

The distilleries passed through many a crisis, The consumption of spirits in the country itself went down gradually, and the export trade could not stand the competition in the foreign markets and consequently decreased enormously. On the other hand, the use of alcohol for industrial purposes increased by leaps and bounds, and this has saved the distilleries from being ruined.

Let us now find out the reasons for this enormous increase in agricultural production. On a close examination, we see that the reasons are manifold.

The development of the natural sciences from the middle of the 19th century furnished the foundation for developing and perfecting the art of agriculture. Liebig summed up the results of the progress in natural sciences during his time and created a new and more exhanstive theory with regard to the nutrition of plants and animals than that which existed till then. This new branch of science was called "Agricultural Chemistry" and brought new life into agriculture. In the fifties and sixties of the 19th century, the practice of draining the land through tile

drains was copied from England and the adoption of that system drained, ventilated and warmed vast stretches of arable land, and laid the foundation for introducing a system of intensive culture.

The teachings of agricultural chemistry found practical application first in the old centres of beet cultivation in the provinces of Saxony, Brunswick, Anhalt, etc. In the same way as these beet farms on heavy soil and the sugar factories connected with them, there arose in regions of light soil other farms with distilleries and starch factories, thus giving a strong impulse to intensive agriculture and stock maintenance. The growth of beets and potatoes demanded a deeper cultivation of the soil and heavy manuring. As a consequence of these better conditions of growth, weeds also began to grow luxuriantly and the farmers were compelled to have recourse to sowing in regular lines, to cultivate the interspaces and thus keep their land free from weeds. Hence the cultivation of beets and potatoes was the beginning for the perfection of the agricultural technic, and also the cause for the springing up of the industry of making agricultural machines in Germany. It was found out that the beet fields had to be ploughed up before winter if one wanted to secure all the benefits of the operation. With the then existing implements and stock it was found practically impossible to get through the necessary work in time. Then the steam plough was introduced, and the demand which thus arose for other power-worked implements such as seed-drills, cultivators, harvesting and threshing machines created the industry of agricultural implements. In the course of a few decades this new industry developed itself to such an extent as to greatly dispense with the import from England and America, and through its own exports began to compete successfully on the foreign markets with the older export industries of England and America.

The bye and waste products of the agricultural industries supplied a lot of feeding stuffs which necessitated the maintenance of more animals, thus increasing the production of manure and contributing to the increase of the fertility of the soil.

The whole system of agriculture gradually acquired the nature of an industrial and commercial enterprise. Through increased application of capital and labour, and a better understanding of the processes of nature, people learnt to compel nature to produce more than before and attained thereby more safety and uniformity in their crops than formerly.

The investment and faster circulation of large capital brought its own dangers with it, and called for the introduction of accurate book-keeping. This systematic book-keeping was gradually developed into a sort of research and control medium with whose help one could follow the increase or decrease of the profitability of the whole industry and its principal branches.

So we see that the agricultural prosperity of Germany began with the cultivation of such crops as beets and potatoes.

After a few decades of perfection of work on the lines indicated above, people began to realise that the then known and cultivated varieties of crops were not in a position to benefit by the improved methods of culture and yield a reasonable profit. Consequently in the sixties and seventies of the last century, better yielding varieties of wheat were introduced from England into the provinces of Saxony, Anhalt, etc. As these varieties did not very well stand the continental winter, and were not suited for the milling process in vogue in the country, a beginning was made to breed the varieties suited to the conditions and the needs of the country.

The increasing of the crop yields through better conditions of vegetation and improved strains of seed brought with it an increase in the diseases and insect pests of crops. Hence

the next stage in the development of agriculture was the development of plant pathology, a biological science which is as important to agriculture, horticulture, and forestry as veterinary science is to domestic animals.

Also the cultivation of the extreme types of soil, such as moor and sand, on the basis of the teachings of Rimpau, Fleischer, Schultz, Lupitz, and Hellriegal, led to a better utilization of those types of lands, increased their productivity and made the colonisation of these tracts possible. On moor land alone, there are still 5,700,000 acres awaiting improvement and cultivation.

Hand in hand with the above improvements in the technic of agriculture, went on extended application of artificial manures. In *1911*, nearly 7 million tons of such manures were used in the country.

In the animal industry, in addition to the improvements on the breeding side, the improvement in methods of feeding based on Kellner's theories and experiments, the development of the diaries through the introduction and co-operation of bacteriologic, so also the controlling of the individual capacity of each animal are the causes which contributed to increased production of meat, milk, butter, cheese and other animal products. The necessary consequence of this improvement was the rapid increase in the import of concentrated feeds which in 1912 exceeded 50 million pounds sterling in value. Barley bran, oil-cakes, oil-seeds and oats are some of the most important concentrated feeds for which Germany is dependent on foreign countries.

Thus when we look into the original causes of this enormous development in agriculture, we find them in the close co-operation of science and practice, in the development of agricultural research aud instruction of all kinds, in the development and fostering of the co-operative system and in the union of the farmers into clubs and societies each of which patronises some special branch of agriculture. For instance, the German agricultural society modelled on the English one is interested in the development of the technic, the farmers' union in the maintenance and improvement of economic conditions necessary for the agricultural industries, and the agricultural chambers as official bodies are busy in developing agriculture in general. Besides these, there are other special societies for special developments. Further, the development and improvement of the means of communication, specially the building of a huge net-work of light railways has contributed not a little to the prosperity of agriculture.

So we see that theory and practice, state institutions, private initiative, and self-help have all worked together harmoniously and contributed to the prosperity of the country before the war.

Let us now compare agriculture in Germany with that in the other civilised countries of the world. The distribution and use of land in the various countries of the world is seen from the following table.

| Lands | Total area in 1,000 acres | Cultivated land | | Meadows and pastures | | Forest | | Unused land | |
|---|---|---|---|---|---|---|---|---|---|
| | | in 1,000 acres | per cent of arable area | in 1,000 acres | per cent of arable area | in 1,000 acres | per cent of arable area | in 1,000 acres | per cent of total area |
| Germany ... | 135,162 | 64,427 | 50·4 | 21,657 | 16·9 | 34,988 | 27·4 | 7,277 | 5·4 |
| France ... | 132,390 | 59,230 | 47·6 | 25,105 | 20·2 | 23,322 | 18·8 | 8,047 | 6·1 |
| Great Britain ... | 78,058 | 18,032 | 26·8 | 29,225 | 43·4 | 3,105 | 4·6 | 10,740 | 13·8 |
| India ... | 629,002 | 293,770 | 62.6 | ... | ... | 82,140 | 17·5 | 139,460 | 25·4 |

The limitedness of agriculture in Great Britain and the extension of pastures and meadows is seen from the above figures. India, Germany and France show the largest area of cultivated surface. In most of the lands above 50 to 63 per cent of the cultivated lands is taken up by grain crop.

Let us now compare the area under each of the field crops in the various lands so far as the statistics are available in rounded average figures based upon a few years before the war.

Cultivated area 1,000 acres.

| Lands | Wheat | Rye | Barley | Oats | Maize | Total area under grain crop | Potatoes | Sugar beets |
|---|---|---|---|---|---|---|---|---|
| Germany ... ... | 5,500 | 15,500 | 4,000 | 10,750 | ... | 35,750 | 8,250 | 1,250 |
| *Austria-Hungary* ... | *12,250* | *8,000* | *5,750* | *7,500* | *8,500* | *42,000* | *5,000* | *1,000* |
| France ... ... | 16,250 | 3,125 | 1,800 | 9,750 | 1,250 | 32,175 | 4,000 | 500 |
| Great Britain ... | 1,750 | 65 | 1,875 | 4,200 | ... | 5,325 | 575 | ... |
| United States of America. | 47,500 | 2,125 | 7,500 | 33,750 | 101,250 | 192,125 | 3,500 | ... |
| Russia in Europe ... | 58,250 | 71,250 | 26,250 | 42,500 | 3,500 | 201,750 | 11,000 | ... |
| India ... ... | 26,250 | ... | ... | ... | ... | 26,250 | ... | ... |

With regard to the cultivation of grain crop Russia heads the list for rye, wheat, oats and barley. Even the United States of America has not been able to approach her in this repect. If only Russia progresses steadily she can very easily supply the world's demand for most of the grain. The United States take the lead only with regard to maize. India occupies the third place with regard to the area under wheat.

The next table gives the total production and the yield per acre.

Total produce in 1,000 tons and yield per acre in cwts.

| Lands | Wheat | | Rye | | Barley | | Oats | | Maize | | | Potatoes. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | per acre | Total | per acre | Total | per acre | Total | per acre | Total | per acre | Total cereals | Total | per acre |
| Germany ... | 4,200 | 8·0 | 10,000 | 7·0 | 3,200 | 7·8 | 8,500 | 7·9 | ... | ... | 25,900 | 45,000 | 54·4 |
| Austria-Hungary | 6,000 | 5·0 | 3'900 | *4'8* | *3,000* | *5·3* | *3,500* | 4·56 | *5,000* | *5·8* | *21,400* | *18,900* | *35·3* |
| France ... | *9,000* | *5·44* | *1,300* | 4·24 | 950 | *5·2* | *5,000* | 5·00 | 600 | 4·8 | 16,850 | 13,500 | 34·4 |
| Great Britain ... | 1,500 | 8·8 | ... | 7·30 | 1,500 | 7·8 | 3,000 | 7·56 | ... | ... | 6,000 | 6,500 | 55·2 |
| Russia in Europe | 15,000 | 2·6 | 20,000 | 2·80 | 8,500 | 3·2 | 12,500 | 2·90 | 1,500 | 4·30 | 57,500 | 30,000 | 29 |
| India ... | 8,200 | 2·84 | ... | ... | ... | ... | ... | ... | ... | ... | 8,200 | ... | ... |

Taking into consideration the other countries of the world, the total production of grain amounts to about 302 million tons and Germany does not even produce 10 per cent of it. With regard to potatoes, the world's production being about 135 million tons, we see that Germany produces about one-third of it and tops the list towering above all other countries. With regard to the yield per acre, England surpasses Germany by a little, a positive proof that the quality of intensive agriculture in England is in no way behind that of Germany. On account of the free trade policy of England, the extent of cultivation in England and the total production of grain in the country itself has lost its importance. Only the best land is under the plough in England, whereas most of the arable lands has been converted into pastures and meadows, so that in this way at least through the minimum capital and labour the land could still be made to yield a profit. In Germany, on the other hand, even the poorer qulities of land being cultivated for the production of food grains, this naturally brings down the average yield per acre. In spite of all that, the fact that there is not much difference in the yield per acre between England and Germany speaks volumes in favour of German Agriculture.

Forty per cent of the total wheat export of the globe goes to Great Britain for the maintenance of the English Nation. In this way England imports annually about six million tons of wheat, whereas Germany only 2¼ million tons.

From the total produce of the globe, only about 14 to 15 million tons or about 15 per cent is available for purposes of export and the rest is all consumed in the countries of production. If the other countries of the world should follow the example of England and import large quantities of grain into the country, this must naturally lead to a rise in prices.

From the cursory view of the production of the world, it will be seen that a continuous increase in the world's population Germany could never think of making herself dependent upon other countries for her grain supplies. To ensure the supply of bread and avoid rise in prices, the only way left open for the central and west European states is the maintenance of their present rate of production and if possible increase it.

So much about grain production. Now about the animal production of the world. The statistics for most of the countries give only the number of animals, but no information about their weight and age which naturally varies a good deal according to the civilization of the country, and the standard of animal breeding and feeding. The difference in religion, ways of living, working and nutrition of the different peoples of the world, the variation of soil and climate in different parts of the earth, has a very decisive influence upon the animal production of various countries.

The following table, containing, of course, only approximate figures, gives an average view of the world's animal production in thousands:—

| Country | Horse | Cattle | Pigs | Sheep | Goats |
|---|---|---|---|---|---|
| Germany ... ... ... | 4,345 | 20,631 | 22,147 | 7,704 | 3,534 |
| Austria ... ... ... | 1,803 | 9,160 | 6,431 | 2,429 | 1,156 |
| Hungary ... ... ... | 2,174 | 7,153 | 5,490 | 7,905 | 309 |
| France ... ... ... | 3,198 | 14,532 | 6,900 | 17,111 | 1,418 |
| Great Britain ... .. | 2,095 | 11,765 | 3,565 | 31,165 | 243 |
| Russia in Europe ... ... | 24,149 | 36,769 | 11,584 | 45,829 | ... |
| United States of America ... | 23,016 | 63,683 | 59,474 | 52,839 | 3,030 |
| India ... ... ... | 1,553 | 119,379 | ... | 23,235 | 3,060 |

Only statistics on the export of meat and animals from a country is the index to meat supply of the world. Only America, Argentine, Australia and Denmark export considerable quantities of meat and live stock. England imports nearly 45 per cent of her meat consumption whereas Germeny imports only 4.7 per cent. Even this small import was going back in the last decade before the war. But as already stated, the production of meat in Germany was dependent upon the foreign supplies of feeding stuffs.

*Such was the position of Germany in* Agriculture before the war. She had not only a flourishing industry, but also a good system of intensive agriculture. What the condition of this agriculture was during the war, the difficulties in the way of maintaining it at the high pre-war standard, and the demands made upon it and how she tried to meet all these shall form the subject of another article.

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The Travancore Government have passed orders regarding certain proposals submitted some time age by Dr. Barker, Director of Industries, for expanding the scope and usefulness of the Department under him. They have approved of Dr. Barker's proposal for oil distillation in North Travancore and jaggery manufacture in Central Travancore for demonstration purposes, and an oil distillation expert has been appointed. Under cottage industries, Government sanction all of Dr. Barker's proposals regarding the opening of a depôt at Alwaye for bamboo furnitnre, another at Mavelikara for the screw pine industry and a weaving depôt at Eraniel. The Director's proposals for an industrial survey for the development of glazed pottery and plantain-fibre manufacture are also sanctioned.

# THE PROBLEM OF HIGH PRICES IN INDIA.

By R. K. Sangameswara Iyer, M. A. L. T.

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"The anger and consternation of all classes of our people at the refusal of war prices to fall, now that the Great War is over, are a chief element in our national unrest. Nor are we consoled by the knowledge that the price level is far higher among our continental allies and in several of our neutral countries"—*Nation*.

Even *in normal times* the *question of* prices is an extremely complicated problem in economics. To the usually intricate web the world-war, that has presented us with such new, wonderful and awe-inspiring experiences in various sphears, has added its own intricate threads to make the confusion worst confounded. We should, however, be neither dismayed at nor lose hope by the more stupendousness and complicated nature of the causes that have been responsible for bringing about this abnormal rise in prices of the necessaries of life in our country. Vital as *the problem is, especially to* a poor country like India that cannot bear this strain for long, an attempt is here made, however incomplete it may be, to throw some light on this vexed problem.

To a person who carefully studies the Indian conditions the bearing of currency prices is, perhaps, the most striking. It is a well known economic doctrine that the quantity of 'money' (*i.e.* metallic money as well as paper) in a country is an important factor in determining prices; that an increase in the quantity of money raises prices and a diminution lowers them. The application of this doctrine to the Indian conditions has got a short history behind it. When a rise in prices occurred in the first *decade of this century, it was mainly attri*buted to the large increase in the volume of the rupee currency, by the Indian economists and the Indian press, ably leaded by the

late Mr. Gokhale. According to them the closing of the mints and the adoption of the gold exchange standard made the rupee a token coin with the result that the rupee currency lost at once the capacity of automatic adjustment to the needs of the country; therefore an inflation of currency resulted in an inflation of prices.

But the Government of India of the time, maintained that the currency had *nothing to* do with rise in prices and that the simultaneous movement upwards in prices and in the volume of currency was merely accidental, and endeavoured to explain high prices by attributing it solely to the adjustment of India to world conditions.

Two clearly marked out stages could be perceived, in this century, during which the prices rose steadily, interviewed by a period of comparatively steady prices. The years 1903-08 mark out the first stage, and 1914-19 mark the second. Let us now examine the following tables:—

Table I.

| Year. | | Coinage of Rupees (in crores) | Index nos. for Rice at Calcutta. (1873 100) |
|---|---|---|---|
| 1901-02 | ... | 4·95 | 110 |
| 1902 | ... | 11.27 | (?) |
| 1903 | ... | 16·53 | 128 |
| 1904 | ... | 11·38 | 129 |
| 1905 | ... | 20·00 | 142 |
| 1906 | ... | 26·08 | 154 |
| 1907 | ... | 18·12 | 155 |
| 1908 | ... | 2·85 | 191 |
| 1909 | ... | 2·17 | 156 |
| 1910 | ... | 2·19 | 148 |
| 1911 | ... | 2·80 | 142 |
| 1912 | ... | 19·53 | 145 |
| 1913-14 | ... | 13·15 | 187 |
| 1914 | ... | 2 | ? |
| 1915 | ... | 1 | 197 |
| 1916 | ... | 32 | 230 ? |
| 1917 | ... | ( | 280 ? |

Table II.

| Year | | | | Gross circulation of Notes (in crores of Rupees) |
|---|---|---|---|---|
| 1900-01 | ... | ... | ... | 25·58 |
| 1906-07 | ... | ... | ... | 45·12 |
| 1912-13 | ... | ... | ... | 65·62 |
| 1913 | ... | ... | ... | 63·9 |
| 1914 | ... | ... | ... | 60·3 |
| 1915 | ... | ... | ... | 62·4 |
| 1916 | ... | ... | ... | 84·4 |
| 1917 | ... | ... | ... | 104·8 |
| *1919* (proposed) | | ... | ... | *120·0* |

Table I shows how the heavy coinage of rupees that commenced in 1902 was kept up till 1908; then follows a steady but negligible rate of addition between 1908-13; the second period of heavy coinage commences again from 1913. These facts must be taken in conjunction with those of Table II which shows how the circulation of notes almost double in the period 1903-08; and also how the increase in note circulation has always kept company with increase in the rupee currency. During the last 2 or 3 years the issue of rupees and notes reach the high water mark in the history of Indian finance, *and it is also in these years that the prices* have risen to the highest point ever recorded.

The above figures tell their own story; at each stage a large addition to the volume of currency has been immediately and systematically followed by proportionate inflation of prices. Hence the simultaneous movement in currency and prices is not a mere coincidence; the rise in prices in the first decade and more especially the abnormal conditions of the last two or three years, are very largely if not mnothly due to the enormous inflation of the currency in the country. "The effect of heavy coinage are cumulative. The Indian authorities do not seen to have understood this"* is therefore quite true.

This increase in currency must again be viewed from another standpoint to realise its full effect on prices. Everyone is familiar with the slackness in trade, both internal and

external, during the war years and after. What the railway and wagon difficulty did to bring the internal trade to a stand still, that the shortage in tonnage did to make the seaborne trade, poor and uncertain. In periods of slack trade even the existing currency will be found superfluous in any country, much more so here where the currency is inelastic. Therefore the large additions to the existing currency, and that *too in* a period of slack trade have tended to doubly react on prices.

Next in importance comes the question of scarcity of food-stuffs and its effect on prices. Here a clear understanding of the cause of this scancity is all important. Is the shortage due to under production in the country or is it due to heavy exports? Let us now see whether India produces enough to support her own population in normal years.

| Year | Acres under cultivation (in millions) | Yield per acre of food crops (in lbs.) | Population (in millions) | Agricultural Producer per head (in lbs.) |
|---|---|---|---|---|
| 1880 ... | 194 | 730 | 181 | 782 |
| 1901 ... | 217 | 840 | 220 | 830 |
| 1916 ... | 221 | 900 | 250 | 796 |

Although the food supply has not kept pace with the growth of population in the last two decades, yet a comparison of agricultural produce per head of population in 1880 and in 1916, shows us that the conditions of 1916 are far better than those of 1880, though the actual condition of 1916 is far worse. Therefore, the rise in prices of food stuffs cannot be attributed to scarcity as a result of insufficient production but to scarcity as a result of reckless export without caring for the needs of the country. Even the most hesitating mind has now been set at rest on this point as the Hon. Mr. Mant has stated in the current session of the Imperial Council that "The one thing that saved India from disaster in the present year is the fact that *she normally exports food grains*." When the situation is described in such strong language by a member of the Government one can easily imagine what an ordeal the country had undergone and how very near the verge of disaster it ought to have been in the last year or two. Bearing in mind Datta's remark "that India proper is gradually ceasing to be an exporter of rice and approaching the stage when it will have to obtain supplies of it regularly from Burma and other countries," it is evident that reckless and abnormal export is an important cause of the present abnormal conditions.

The increase of money and the shrinkage of supply do not, however, in themselves account for all the trouble. The appressively high prices of food-stuffs and other necessaries of life might also be directly traced to the half-hearted incomplete way in which the distribution has been effected. Ever since the era of Railways we have been familiar with the part they played in fair distribution and the influence they exerted in bringing down prices to a common level throughout the country. In the last few years, however, the poor railway facilities, and the short sighted, insular railway policy make one believe that railways have ceased to exist from the point of view of efficient and effective distribution. In pre-Railway days, the price was low in tracts of plenty at least, but not so now. The phenomena of "a province with abundance of food bordering on a district with a population starving for want of the same" so common in pre-Railway days has, in the last few years, given place to the more curious phenomena of a taluk or district with abundance of food surrounding towns and villages, where the population struggles for existence. Speculation and profiteering have been rampant; its opportunities are innumerable. Merchants and middlemen have been hankering after war-profits by cornering and other devices;

bags of food stuffs that should at least have gone to relieve local distress, have often had a tendency to accumalate in the railway sheds, already full to overflowing. Under these circumstances the only agency that could have managed the situation and relieved the strain would have been the Government; it should have taken upon itself completely the control of supplies and the work of distribution. In isolated instances where it had done so it has been a real boon to the locality. To cite an instance in Kurnool, which is, not a rice producing country, rice has been selling at $3\frac{3}{4}$ seers (Madras) per rupee, as a result of Government control; while at the same time at Erode, which is in the midst of a rich rice producing centre, the same commodity sells at $1\frac{3}{4}$ Mad. seers per Rupee! The way in which the kerosine oil was distributed is too notorious and fresh in the minds of every one to need comment. To give the other side of the picture, the economic situation in the native State of Mysore has never been so acute as that in other parts of the country; and this is wholly due to the prompt action of the Government of that State by way of wholesome restriction of exports and proper control and distribution of food-stuffs in that province.

Let us now turn our attention to a wider field and consider India as a world unit, that is, let us just look at the external causes that have indirectly contributed their share to the present situation in India. An account of the Great War a very large number of men,—30 to 40 millions perhaps—of the best productive age have been suddenly shifted from productive processes into the trenches—an occupation which from the economic point of view may be considered as waste and useless. Add to these again, the far larger numbers of 'war-workers' that were mainly engaged in innumerable factories and industries connected with war. Now, considering the world as a unit, it had the great burden of supporting many millions of its most able bodied men, who contributed no useful share to the world's production for a considerable time. This large strain over resources of the world, enhanced by transport difficulties and poor or no production in vast tracts of land in and around the war zones of three continents has materially affected the supply of food-stuffs in the world as a whole. Now, though the war is over the difficulties and uncertainties of demobilisation, and "the delays in readapting the industrial plant from war to peace purposes," leave the position almost unchanged. Hence the shortage of food-stuffs throughout the world and the universal rise in prices, from which India cannot escape.

Again, 'the artificial abundence of money' seems to be a world disease. In the words of a recent writer—"The major part of the price-rise in every country has probably been due to the inflation of the currency. The use of our banking system to create credits for direct or indirect lending to the Government has been a larger, subtler and even more dangerous inflation......We are not living on a basis of honest money and the least scrupulous Government of our times still wields power to debase the currency. The continuance of gigantic unproductive expenditure by the Governments notes industry of the capital it needs for reconstructed and expanding industry. This reduces the supply of goods, while it involves a further creation of bad money." Such is the state of the world; so long as this state of things persist in the outside world the prices in India cannot come down quickly. To quote the *Nation* again, "there is no near prospect of relief. When the armistice came everyone anticipated a gradual decline of prices as industry and commerce began to assume their normal shape. Now the oracles are dumb. And yet the situation is one that calls for a clear and tolerant judgment. For it is both difficult and dangerous." May the Commission, to be soon appointed, successfully solve this vital problem for poor India.

## MODE OF PREPARING SEED-LAC FROM CRUDE STICK-LAC.

By L. S. Subramhanya Iyer, B.A.,
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Lac in its raw state is an incrustation round the twigs of trees on which it is formed by the Lac-insect and in this state it is called *stick-lac.* The stick-lac as such or after scraping off the twigs should not be stored away, or transported over long distances as certain insects and fungi which attack the lac-insects and the lac while yet on the trees will remain alive in the lac-incrustations and damage the quality and quantity of it even after scraping, thereby diminishing the quality and its commercial value. There is also the risk of fermentation setting in by storing away such lac in bags or other receptacles, thereby lowering the percentage of lac-resin.

The first thing to be done is to scrape the lac-incrustations off the sticks immediately they are removed from the trees. This is done in one or more of the following ways:—

1. by twisting the stick when the incrustation loosens and falls off,
2. by scraping off the incrustation by knives,
3. by driving a roller over a layer of incrusted twigs spread evenly and picking off any lac adhering to the sticks,
4. by a combination of roller and sieves as in the modern improved process, which not only separates the sticks from lac, but also crushes the lac and grades it into coarse and fine grains.

The crude lac after being removed from the sticks must not be dried in the sun as this may tend to melt and turn over the edges of cells of which it consists, thus forming what is commercially called "*Agglutinated lac*" from which it is difficult to remove the dye.

Soon after scraping it is necessary to remove the colouring matter called *lac-dye* from the crude lac and to convert the latter into a condition fit for storage or use. Both these objects are realised by crushing the crude lac, cleaning it of all foreign matter such as bark and woody pieces of the twigs remains of dead lac-insects and its predacious enemies, and washing it repeatedly until the "*grain-lac*" ceases to impart colouring matter to the water used in washing.

Mr. Puran Singh, formerly Chemist of the Forest Research Institute at Dehra Dun, advises the preparation of "*seed-lac*" when the stick lac is still green, that is, when the albuminous and colouring matters are in a semi-fluid state. In this state the lac is easily pulped and the pulp readily gives off its colouring and albuminous matters which are then easily soluble. This may be easily followed by our Lac Farmers with great advantage as it will improve their product and its sale price. The pulping and washing can be done in the neighbourhood of the lac producing area itself, with the help of a mallet or pestle and mortar, to crush the *stick-lac* and a few tubs and mats to wash and dry the *seed-lac.* Women can easily clean the *seed-lac* of its remaining impurity, by hand-winnowing, in which they are adepts.

### Converting "Stick-lac" into "Grain or Seed-lac."

*Stick-lac* is first pulverised either by beating with a mallet or pounding in a mortar or by a system of automatic rollers and sieves alternately arranged and worked by power. The first two methods are simpler, cheaper and more suited to our conditions, our output being too small for the third process. The pulverised lac is put in large troughs, vats or tubs provided with a stop-cock at the bottom. The lac is then covered

with water and allowed to soak for about 24 hours. After soaking it is thoroughly treaded, turned about and gyrated by men, with their feet. Thus the colouring matter is loosened and held in solution by the water, which when saturated with the dye called "*dye-liquor*" is run off by the bottom cock to a trough below, where the dye is allowed to settle down: sometimes lime-water or oxide of tin are added to hasten the deposition of the dye. This process of washing is repeated until the wash water runs clear and colourless.

The washed *grain-lac* is now dried in the sun, cleaned and sorted or graded into coarse grains, fine grains, and dust.

The lac in this form can be stored and is fit for transportation. Moreover being then freed from all extraneous matter, and considerably reduced in weight and volume, the cost of its transport will be appreciably lowered, while its price will be very materially increased.

It is found by experience that Kusam (Kan.-Sagade) lac keeps in good condition much longer than other kinds such as Palas (Muttuga), Pepal (Arali or Aswatha), etc. "The quality of lac varies according to the tree upon which the lac-insect feeds. The Kusam lac is said to last for ten years while all other qualities remain in good condition only for two or three years."

"Seed-lac" when stored for a long time becomes insoluble in alcohol, which is considered the proper solvent for *shellac* for the majority of commerical purposes for which *shellac* is used such as French Polish, Spirit Varnish, etc. This tendency to become insoluble is common to all forms of lac; but Mr. Puran Singh recommends the steeping in water for some time of such lac, to restore it to its original solubility.

Lac is used in India for making varnishes and polishes in lacquering wooden and metalic toys, ornamental boxes, etc., in fixing blades of knives to handles and hafts to swords, in filling in gold ornaments, for making bangles, bracelets, rings, beads and other trinkets worn by women, especially among the poorer classes, for making button, shuttles, sealing wax, etc., in manufacturing grindstones, and in medicine.

In Europe, America and other western Countries, lac is employed for making sealing waxes, Varnishes, as a stiffening for silk and straw-hats in combination with other resins and gums, lithographic inks, gramophone records, as a cementing, luting material for uniting surfaces of wood, metal, glass, leather, etc., in making Japanese varnishes, for lacquering wooden and metal articles, and as an insulator in Electrical appliances.

[Note by Rao Saheb M. Rama Rao, Special Forest Officer:—The above note was prepared by Mr. L. S. Subrahmanya Iyer, at my request in order that a description of the method of converting *crude-lac* into marketable *seed* or *grain-lac* may be printed, translated and distributed among the forest leassees or contractors of Lac-Farms in the State. At present, they collect the crude-lac and sell it away after storing it for some time, at prices hardly a third of the actual market rates in Calcutta. For instance, the present market rate for crude stick lac is about Rs. 75 per Bengal Maund (*82 lbs.*) at Calcutta, whereas the present market rate at Bangalore is about Rs. 11 per local maund (*24 lbs.*). By storage, of *crude-lac* which contains living predacious insects and fungii, is considerably deteriorated in quality and quantity, thereby diminishing its utility and value. If the simple and inexpensive method described in Mr. Subrahmanya Iyer's Note of preparing *seed-lac* from the *crude-lac* is adopted by our lac Farmers, they will realise very good profits. Lac is one of the important articles of export from India. India is the largest and practically the sole supplier of lac to other parts of the world. The average annual export of this article is 20,000 tons valued at about three crores of rupees. Almost the whole of this quantity is produced in North India and Burma, South India contributing practically nothing. The Mysore State possesses the requisite conditions favourable for producing ten lakhs of rupees worth of lac annually, if her re-sources are fully developed.]

## NEW SOURCES OF LEATHER SUPPLY.*

BY ROBERT G. SKERRET.

HERETOFORE, with minor exceptions, we have depended upon the skins and hides of land animals for the great bulk of our leather stocks. To-day, because of the reflexes of the war, and owing to diminished if not totally destroyed herds of cattle, sheep, goats, etc., we, with other peoples, are face to face with an unprecedented shortage of leathers. And, what is equally disquieting, this scarcity is going to lay a tax upon all of us.

The pinch upon our purses will come home most directly through the added prices that are certainly going to be charged for our footwear next fall and winter. The average pair of shoes will cost us something like a dollar more if the expers of the leather industry be correct in their prophecy. That is to say, the nation as a whole will have to hand out for its boots and shoes a matter of $100,000,000 additional to cover its feet in the course of the next six months without gaining anything in the way of improved articles.

We are accustomed to boast of our self-sufficieny when it comes to raw materials, especially. It will, therefore, probably shock many good Americans to learn that the United States commonly relies upon the outside world for nearly half of its cattle hides, for well-nigh all of its goat skins, and likewise for a very large part of the pelts of sheep and calves consumed here. From an industrial point of view, the present leather shortage and outlook become even more serious when we recognize the fact that we have grown to be the leading nation among those manufacturing boots and shoes. What are we going to do to make up the existing scarcity and to insure our factories against shut-down or woefully diminished output?

MANY USES FOR LEATHER.

During 1917 we imported 700,000,000 pounds of hides and skins, valued at the ports of entry at $216,000,000. Since then, there has been a notable decrease in the quantities of leather stocks brought into the United States, and this falling off has reached hundreds of millions of pounds. Only a part of the leather worked up here annually goes into footwear. Much of it is demanded by the upholsterer; great quantities of it are used in the making of harness and saddlery; the glove trade levies a big toll; and then its employment is varied in the fabrication of travelling bags, handbags, pocket-books, and an endless multiplicity of other useful as well as ornamental articles. In the field of mechanics, leather meets with peculiar fitness numerous needs, and the whirring wheels of our factories and other services calling for power transmission would be at a loss if a sufficiency of leather belting were not available. Finally, the automobile and aircraft have brought to the fore the advantages of leather in providing especially suitable garments.

Manifestly, the demands for leather stocks are certainly going to increase rather than to diminish; and if the herds, the droves, and the flocks of land animals are inadequate, from what other sources can we obtain skins susceptible of being tanned and made fit to meet these manifold services? Happly for us the period of strife has stimulated research and brought about material achievements which otherwise might still be remote potentialities. Quite two years ago, the Department of Commerce urged the experts of the leather industry to see what they could do here towards successfully tanning the skins of a number of marine mammals and fish.

Previously, the skins of some domestic porpoises had been tanned but not in sufficient measure to loom at all conspicuous in

* With Acknowledgments to the *Scientific American*.

the volume of the native leather industry. There were two reasons for this. First, the catching of the porpoise was an infrequent occupation and we had little if any trouble in securing from long-established sources the desired amounts of leather stocks; and, next, porpoise leather for boots or shoes found only a limited use owing largely to the fishy odor that clung to the finished product. The more common employment of the leather was in the form of shoestrings. In England, on the other hand, for a good long time, the tanners have been producing a fine grade of so-called porpoise leather from the skin of the beluga or white whale, which attains a length of 18 feet or more and will average in girth from ten to twelve feet. This leather has great tensile strength and is remarkably well adapted to the making of machinery belts; and because it keeps its shape under verying stresses it is admirable for working into shoes. The beluga abounds in the waters contiguous to the northern coasts of this continent.

A CONCERN THAT HAS SUCCEEDED.

The most significant development in the art of converting the skins of aquatic creatures into leathers of excellent grades is that now being pursued upon a commercial scale in dealing with the hides of sharks, rays, dogfish, blackfish, etc. Despite the fact that many firms, encouraged by the United States Department of Commerce, failed to secure satisfactory results, one New York concern has solved the difficulty that has hitherto baffled the tanner. One of the early operations in preparing the skin of the aquatic animal for tanning is that of soaking the hide in lime solution. If this is not done with extreme care and with due regard to the natural differences peculiar to the fish skin the resultant product is so spongy and lacking in strength that it has practically no market value. This stage of the process has pretty generally ruined the skin and made further work upon it quite useless. To-day, the secret of a correct lime bath has been discovered, and, similarly, some other phases incidental to the manipulation of the skins have been mastered. Among these is a degreasing treatment which effectually removes the fishy odor.

The adaptation of the shark skin to the general purposes of the leather worker has presented distinctive difficulties—so, too, has the skin of the ray and the dogfish—because of the horny, tuberculous exterior which is frequently so hard that it can be ground down only by means of abrasive belts or wheels. In fact, this shagreen has been extensively employed by cabinet-makers, ivory workers, metal workers, etc., in lieu of emery cloth and sand paper. The question of making shark skins available for leather has, therefore, rested in part upon divising ways to get rid of the shagreen. The results as a rule have been anything but satisfactory, simply because grinding away what might be called the superficial hard material still left the supporting parts or bonds imbedded in the leather, to just that extent stiffening it, greatly hampering cutting and sewing, and yielding a product which had numerous drawbacks.

Thanks to recourse to chemistry, the shagreen can be completely separated from the underlying skin and yet leave the hide beautifully marked with its characteristic "grain." So dressed, the leather lends itself to the manufacture of bags, belts, card cases and other articles where an ornamental surface is desired. With this exterior removed, either the upper layer of the skin or the underlying "splits" can be dressed for shoe stock—including the heavy material for soles. The leather will take a beautiful finish and is notably durable. From a 500-pound shark it is possible to obtain ten square feet of leather from the hide, and the stomach furnishes a raw material that will yield a leather which is soft and strong and looks not unlike glazed kid when ready for the market.

The ray or devil fish will frequently provide a skin, when tanned, having an area of 100 square feet; and the sawfish is also a potentially abundant source of leather stock. The dogfish, being comparatively small, is not as individually profitable as the full-grown shark, and yet its hide is well worth tanning. The porpoise, depending upon its size, will give a skin susceptible of producing anywhere from 10 to 20-odd square feet of leather. Not only that, but from this skin can be taken a sturdy upper layer of grain of very fine quality and then two underlying "splits"- the first of these being thick and strong enough for a good grade of heavy shoes, while the second "split" is of the character of a thick suede. The intestines of the porpoise make leathers for which there are many uses. The skin of the blackfish and likewise the skin and stomach of the whale lend themselves to tanning, and from these several sources leathers of fine qualities can be secured.

UTILIZATION OF OTHER PARTS.

But this whole question of "sea leathers" would make but a moderate appeal to enterprise and capital if it were not possible to utilize other parts of these aquatic creatures. From the livers of the shark an oil is obtainable, also from the livers of the dogfish, which is said to have much of the medicinal properties which characterize cod liver oil, and, besides, the oil is in demand for the manufacture of soaps, for mixing paints, and for the treatment of some leathers. A 500-pound shark will give an average of from 10 to 15 gallons of liver oil, which is easily marketable at fifty cents a gallon. The dorsal fins, when dried, bring $2.50 apiece among Oriental epicures. The teeth sell readily for five cents each to manufacturing jewelers who work them into ornaments of one kind or another. The flesh of the shark is said to be decidedly palatable, and the Bureau of Fisheries has published some thirty different recipes for fresh shark, smoked shark, salt shark, and canned shark. In common with the meat of other sea creatures, the flesh of the shark can be converted into fertilizer or dried and ground chicken and cattle food. As a fertilizer the stuff is rich in ammonia and phosphoric acid. Sharks in our southern waters range from 400 pounds to 2,000 pounds in weight, while the devil fish or ray will frequently tip the scales at 3,000 pounds.

PORPOISE YIELDS OIL.

The porpoise, besides furnishing skins that can be tanned, yields three grades of oil—*i.e.*, body, head, and jaw-pan. The latter is especially valuable as a lubricant for watches and other fine mechanisms and, to-day, fetches quite $50 a gallon. Certain parts of the skins of some of these aquatic animals—parts that are not worth tanning—contain fully 90 per cent of glue. Likewise, from the blood of some of these creatures is to be had the basic material for a superior kind of waterproof glue such, for instance, as is desired in the built-up stock now used in making airplane propellers and other wooden parts of the flying machine. From the intestines that cannot be worked into leather it is possible to get the gut for string instruments, tennis rackets, etc., and sausage casings, parchment, stopper-covers, glue, and other marketabe commodities. The point is, nothing need go to waste; and, at the same time, an inexhaustible source of leather stock is thus made available which heretofore has been almost entirely neglected.

# ECONOMICS IN THE WEST.

## Industrial Situation.

*London, 21st September, 1919.*—Since the despatch of my last letter there has been a marked improvement in the industrial situation. There are still ominous rumblings and mutterings in the Labour world accompanied by such occasional outbreaks as occurred at the Trade Union Congress at Glasgow where a vote was given in favour, nominally at all events, of that form of revolutionary action which masquerades under the name of "direct action." But the voice of reason is being increasingly heard in Labour circles. Men like Mr. Clynes, the late Food Controller, Mr. Havelock Wilson of the Seamens' and Firemens' Union and Mr. Brownlie of the Amalgamated Society of Engineers are standing out courageously against the subversive doctrine which if carried into effect would Bolshevise British industry. They see clearly, as others do, that any attempt to overawe the Government by a general strike would recoil with disastrous consequences to the promoters. As Mr. Clynes pointed out in a singnlarly convincing speech the men who are most promiuent in clamouring for the adoption of extreme measures were precisely those who were worst defeated at the polls at the General Election. The truth is that the country is set resolutely opposed to the principles which these men represent. The feeling against them has strengthened rather than weakened of late. The nation needs repose and it will make short work with those who seek to create a sort of Civil War.

## Lord Fisher's Reminiscences.

Lord Fisher's breezy reminiscences which are being published in the *Times* are of exceptional interest from many points of view and not least from the light they throw on future developments which will profoundly influence industry. The distinguished writer lays especial emphasis on the future predominance of the internal combustion engine with its almost inimitable corollary the use of oil instead of coal as a source of power. He is so convinced of the effectiveness of the new type of engine that he foresees a time not far distant when all the ships of the navy will be driven by this agency. He is naturally concerned in the main with the nation's chief fighting arm, but if his theories are sound the internal combustion engine will be nsed largely in the mercantile marine and for industrial purposes. His views have not escaped severe criticism at the hands of professional engineers, who have not been slow to point out the present limitations of the new agency. But in the main he is probably correct. Though it is true that the internal combustion engine has yet to reveal its adaptability to the purposes of large ships, it is evident from the success that has so far attended its employment that the principle is sound and only needs to be developed on proper lines to assert the same superiority over the older type of engine that the turbine has done.

## British Aniline Dye.

So many contradictory reports have been circulated as to the British aniline dye industry which is one of the products of the war period, that it is satisfactory to have a definite statement showing that real progress has been made. The authority is the head of a leading firm of Yorkshire chemical manufacturers who has been closely indentified with the pioneer work undertaken to establish the new industry. This gentleman asserts that British firms will not only be able to compete favourably with German dyes sent into this country but they will also prove formidable rivals for the trade in other countries. Up to the present, he states, British firms have not attempted to make every dye the Germans made, for this was

a practical impossibility seeing that the Germans with 30 or 40 years' experience behind them, sent from 800 to 1,000 different colours over to England. But by tackling the principal colours, those for which there is, and will be, the greatest demand and which can be turned out from an economic point of view, they have accomplished a great deal. Moreover, the time is not far distant when British manufacturers will be able to produce any dye that Germany made before the war. Even now a wonderful export trade is being done in British dyes, a thing unheard of before the war. Especially is this the case in regard to a dye known as nigrosine black used for leather, the monopoly of which was formerly held by Germany. It is, of course, yet too early to speak of the permanence of the progress that has been made. We have yet to hear from reconstructed Germany and her reply to the British challenge to her old dye supremacy may be very effective. But at least it may be said that the British dye maker has established a position in the home market from which he cannot be displaced under the conditions which the Government have arranged for the protection of the industry from unfair competition.

### Industrial War Work.

Now that the fog of war has lifted we are getting some interesting glimpses into the working of the tremendous industrial machine which the Government created for war purposes. An illustrated booklet just issued, for example, tells us what was done by the great engineering firm of Armstrong, Whitworth & Co., and a wonderful story it is. We gather from it that more than 13,000 guns and carriages were completed, the sizes ranging from 6 pounder tank guns to 18 in. naval guns weighing 152 tons each. The total number of war vessels built was 47, while 62 warships, including nine Dreadnoughts were fitted with armament. For the submarine fleets 970 torpedo tubes were provided and aeroplanes and tanks were also made in great numbers. But the most remarkable achievement of the Elswick works was in the provision of ammunition. The total number of shells turned out was 14,500,000. In addition fuses were made to the number of 18,500,000, and there were also supplied 21,000,000 cartridge cases, 4,400,000 lyddite block charges and 3,000,000 filled shells. Imagination is staggered by these figures. Also, perhaps, the mind is saddened by the record of the production of this huge body of elements of destuctiveness. It is, however, some consolation to know that the splendid enterprise which made this possible is now being devoted to the productions of peace with some assurance that the ultimate results will be equally brilliant.

### Some other Revelations.

At the British Association gathering at Bournemouth this week there have been other instructive revelations of the achievements of British science and industry in the war. Perhaps the most arresting statements were those contained in the opening address of the President, Sir Charles Parsons, where he contrasted the energy expended in the past mighty conflict with other wars. He showed that while at the battle of Waterloo the total weight fired by the artillery was only 37·3 tons and that in the whole of the South African war the artillery ammunition fired did not exceed 2,800 tons, in a single day on the Western front the British guns expended 18,080 tons of ammunition, while during the whole war in France alone British guns discharged nearly three and a half million tons weight of metal. Less appalling and infinitely more encouraging were the details given relative to the various devices employed in the war as an aid to our offensive and defensive agencies. Highly instructive was the story of how by a careful scientific examination of the structure of the ear of a whale the scientists devised a sound instrument which enabled

our criusers to detect the presence of submarines. Another device which the Germans were the first to use was an insulated cable laid along the bed of the sea which enabled ships to work in and out of mine fields without risk. The public were also told of an ingenious system of sound ranging by means of which it was possible to locate within fifty yards enemy guns which were firing nearly a mile and half away. It is obvious that these inventions will have their usefulness in days of peace as in war. For example, how valuable will be the insulated cable to vessels finding their way out of a harbour or through a dangerous channel at night or in thick weather? Sir Charles Parsons, who it is scarcely necessary to remind my readers, was the inventor of the turbine, though he made no reference to the internal combustion engine had a a good deal to say about the future sources of power. He expressed the view that as in the past so in the future England would have to depend upon her coal supplies for her heat and source of energy. Discussing water-power, he pointed out that the average capital required to produce electrical power from coal is less than half the amount that is required in the case of water-power, though the running costs are much less in the latter instance. He added the interesting calculation that if all the water-power of the world were harnessed, the cost would amount to about 8,000 millions—about the total of the British war charges. Looking into the future, Sir Charles foreshadowed the possibility of developing molecular energy and suggested the driving of a shaft twelve miles deep to ascertain whether means of power might not be derived from the earth's interior. As an encouragement to such enterprise he mentioned that in Italy bore holes had been sunk which discharged large volumes of steam, a force which was used to drive 10,000 horse power turbine engines. As the twelve mile bore hole would cost £5,000,000 to sink and would occupy 85 years in the sinking, it can hardly be regarded as a practicable proposition. But there can be no question that in the hidden forces of the earth's interior are vast possibilities.

Margarine in the past few years has been for home staying people almost as blessed a word as was Mesopotamia to the old lady of Evangelical leanings. At the British Association meeting Professor Halliburton let the public into the secret of how Britain had made herself largely self-supporting in regard to this product. He also had a good deal that was interesting to say about the dietetic character of margarine. He, after pointing out that the perfect fat is one which must contain an elusive element known as vitamine, went on to say that no purely vegetable oil contained this element. Hence it follows that margarine to be really nourishing must contain some admixture of animal fat. The vegetarians have yet to be heard in regard to this theory and in the meantime probably the bulk of people will share the pronounced preference which Professor Halliburton expressed for butter over margarine. This preference will most likely be strengthened by some revelations he made as to successful experiments made in the conversion of castor oil into margarine. Visions will arise when the daily fat of butter substitute figures on the table of matutinal doses of oil and fancy will detect the familiar smell of the potion in the yellow material of the breakfast table. However, judged from the standpoint of public interest it is a great thing to have manipulated castor oil in this fashion. The Government have immense stocks of the oil and in the new conditions they will be able to dispose of them to the best advantage. Another aspect of the matter which deserves consideration is the fillip that this new development of the margarine industry is likely to give to castor oil production. For a long time past cocoanut oil has been at a premium largely because of its increasing use in the process of soap, candle and margarine

*manufacture.* Castor oil is almost certain to undergo a similar appreciation in value. Therefore cultivators of suitable lands for the plant cannot do better than give their serious attention to its introduction into their agricultural programme if they have not already grown it.

To continue this record of war reminiscences, I may draw attention to a paper read by Dr. E. J. Russell on fertilisers for the land which is worthy of notice in the columns of a journal such as this. Dr. Russell after emphasising the growing importance of artificial fertilisers in the economy of agriculture, stated that many experiments had been made with regard to the utilisation of surplus explosives left in hand at the date of the Armistice The agricultural problem in respect to nitrate of ammonia had been satisfactorily solved, and that substance could now safely be used. A method had also been devised for making fertiliser out of cordite. Further, there was considerable hope of greater use of sewage as a fertiliser. In India there are obvious objections to the use of sewage, but there as elsewhere in the Empire there must be a good deal of surplus cordite and nitrate of ammonia which the authorities could turn over to Agricultural Societies for experimental use. Unquestionably it is in such experimental measures that the chief hope lies of a permanent improvement of Indian agriculture.

ARNOLD WRIGHT.

## INDUSTRIAL NOTES FROM THE UNITED STATES.

### The Story of the Great Amoskeag Mills.

*Washington, D.C., U.S.A., Aug. 19, 19.*—On the banks of the far-famed Merrimac River, at Manchester, New Hampshire, are located the largest textile mills in the world. These mills are noted for many reasons: they are famous not alone for size, covering an immense stretch of territory, and output, which is known the world over, but also for an almost perfect system of welfare work, by which an army of workers are made and kept happy and contented.

Each employe, from bobbin boy to boss, reports every day at six o'clock, and from the day the whistle blows until quitting time these vast mills are in constant operation—a literal hive of industry. Thus it has been, six days in the week, eversince 1831 eighty-eight years without intermission, strike, tie-up or labor trouble.

Not alone do the mills cover many acres, but the homes of the workers, to the number of 834 separate neat brick buildings with grounds around each, spread out over a vast amount of ground.

The married men of family have the first choice in renting these homes, and they are also permitted to buy the home if they desire to do so. Some arrange to pay off a mortgage placed by the mill in the form of rental. This is done to keep the worker in the territory controlled by the mill and contiguous to it. A small rental is charged those who do not care to purchase—barely enough to pay the expense of upkeep of the property, the housing proposition not being a money-making venture in any sense.

The Amoskeag Mills have many notable innovations, but chief among them is the "housekeeping flying squadron." It works

in this way: Suppose one of the workers finds his wife and helpmate ill and several small children to be taken care of. Does he stay at home from his work to nurse and attend his sick family? No. He simply communicates with the "service department" of the mills, and at once a competent housekeeper is sent to his home to care for those unable to care for themselves until they recover and everything is normal again. Not an hour is lost by the head of the family. In addition to this a staff of physicians is constantly available and always in attendance.

The Amoskeag Mills employ 8,500 men and 7,000 women—a total working force of 15,500 people, with a weekly payroll averaging close to $300,000. The mill proper and its various outbuildings cover over 137 acres and have a floor space of 6,844,340 square feet. Nearly 400,000 yards of cloth of various kinds and 395,000,000 yards of cotton textiles, ginghams, etc., are woven in the average working year.

Since the Amoskeag Mills were incorporated, in 1831, almost $260,000,000 has been paid out to its employes in wages and bonuses.

The writer has just returned from a visit to the mills, the trip serving as a vacation period. While inspecting the great plant he asked the superintendent—a man grown old in the service of the mills, but still having a joyous heart and an upward look—"What has been the chief cause for your absence of labor troubles and the very evident content and happiness of this army of people?"

"We have succeeded," he replied, "because we have always and under all circumstances treated our help right, we have always tried to keep the point of view that they were a part—and a very essential part—of the enterprise. We have encouraged a spirit of thrift among our people, and have gone to great lengths to make our employes feel that we do not lose interest in them when the whistle blows. It's pretty hard to make a malcontent or a disturber out of a man whom we have helped to own his own home. We are located, as you see, in a small town, comparatively speaking, but since our establishment in 1831 we have been entirely free from labor troubles of any kind. When any employe, man or women, has a grievance, real or fancied, he or she knows that the boss's door is always open and they are encouraged to come direct to head-quarters, and we are ready to go a little more than half way in straightening the matter out. Our payroll has increased substantially every year. We have never reduced an employe's pay, and we want our employes to earn over and above their salaries all that it is possible for them to make. There is no limit. With that object in view we have installed a liberal system of bonus payments which works out in a very equitable way."

EMPLOYES' INSURANCE.

An interesting and popular industrial feature of many of the larger business and manufacturing establishments of the United States is the plan of employes' insurance, by which, according to the term of service of the worker, each employe of an establishment who has been in its employ for over six months is guaranteed a certain amount of insurance in the event of his death. The minimum amount in one large establishment is $300 and the maximum amount is $1,000.

One of the manufacturing concerns which have brought the plan to a practical success is the Karpen Furniture Co., of Chicago, the largest furniture manufacturers in the country. The big organization has been particularly happy in its relations with its employes, many of them having been in the service of the company for thirty and forty years. Efficient and faithful workers seldom leave the Kerpen service. It is partly a reward for faithful service in the past as well as a recognition of the spirit of the times which

tends more and more toward co-operation between employer and employed that the big Karpen organization has adopted the new insurance policy.

The firm believes that bolshevistic and radical tendencies are best combated by friendly understandings and the assurance of the employe that in the event of death those dependent on him will, at least in some measure, be provided for. The Karpen organization provides for relief in case of the worker's illness or incapacitation. The new feature has been enthusiastically and gratefully received by the big army of employes. The following is the plan in detail as furnished each employe. To our Employes:

We desire to announce that we have secured a contract from the Aetna Life Insurance Company, of Hortford, Conn., whereby the employes of our company are protected with a life insurance policy during their term of employment with the company in case of death from any cause, at any time or place.

This protection is provided: First—Because we wish to encourage every one in his common duty of providing for those who are dependent upon them. Second—Because we wish to help you free your mind from worry caused by dependents unprotected in case of your death. Third—Because we wish to encourage every-one to steady work and loyal co-operation.

The amount of insurance upon your life is graded according to your term of service and from the following table you can easily figure out just how much insurance you are entitled to at this date:

Less than six months' service—No Insurance.

| | |
|---|---|
| Six months to one year continuous service ... ... | $ 300 |
| One year to two years continuous service ... ... | $ 500 |
| Two years to three years continuous service ... ... | $ 600 |
| Three years to four years continuous service ... ... | $ 700 |
| Four years to five years continuous service ... ... | $ 800 |
| Five years to six years continuous service ... ... | $ 900 |
| Six years and over continuous service ... ... | $ 1,000 |

As you complete each continuous period of service your immence will begin or be automatically increased to correspond with the above table.

This action has been taken as a means of expressing our appreciation, in a substantial form, of the value we place upon the loyal co-operation of our employes and as a means of our providing for those dependent upon you immediately at the time of your death, at which time they may need it most. The insurance is paid for by S. Karpen & Bros. It costs you nothing while you remain in our employ. This insurance is in addition to any payments provided for by the Workmen's Compensation Act or sick benefits to members of the Carpen Mutual Benefit Association.

We trust that you will accept your certificate as an expression of our sincere appreciation of your work, and we hope that your association with us may be productive of mutual benefit.

### TICKLISH TUNNELING UNDER THE EAST RIVER.

A very interesting bit of tunneling has just been completed on the great Fourteenth Street tube under the East River, New York City. The heading was being run in rock, and at several points testing holes showed a thickness of only eight inches of sound dry rock above the line along which the top of the tunnel was to run. As the tunnel was being driven without the use of compressed air—which has been used in nearly all of the tunneling operations around New York—it was decided to drop the upper heading four feet until this thin cover of rock was passed. The cast iron lining was set in place at each

side of this section, and then the rock was removed very carefully by using a great many holes each loaded with about one-eighth of a stick of dynamite. As each bit of rock was removed to the arch the tunnel lining was set in place. By this means the dangerous section was tunneled without breaking through the thin shell.

### Simplifying Automobile Repairs.

Automobile repairing following a collision or other accident is receiving largely increased attention in all parts of the United States.

One of the most common repairs to an automobile frame is straightening a spring horn or "dumb iron" in the event of a collision. A very simple and effective method of performing this work has just been devised, providing that the frame is bent forward of the radiator support and that the shock has not cracked or materially injured the metal. If the frame side is cracked it will be well to straighten it to its original form and then fill in the cracks with new steel by the oxy-acetylene process. If the frame is merely bent straightening it to its original form will be all that is necessary to effect a permanent repair. The radiator should be removed as well as the front axle and the springs. The front of the machine is supported by blocking under the frame members or by any suitable stand. The body should be raised from the chassis about four inches at the front end so that a loop of chain can be passed around the frame member to act as an anchorage for a piece of joist used in straightening the side members.

A piece of sheet steel is placed under the frame and supported by the box, the top of which has been covered with about three inches of sand. A rough furnace may be constructed of fire brick and the frame covered with charcoal, a slab of firebrick serving to keep the heat confined to the bent portion of the frame. A large gasoline blow torch is employed in connection with the burning charcoal and sufficient heat is applied to bring the frame side to a cherry red heat for several inches on each side of the bend. The torch is then set aside, and while one man carefully manipulates the jack, which is best placed against a piece of board resting on the frame member at the point where the engine support is bolted or where a cross-brace is rivetted, an assistant facilitates the work by hammering and contouring the heated section to bring it back into shape. A blacksmith's "flatter" should be interposed between hammer and frame in order not to dent the frame side, as might be done if the hammer blows were directed against the heated members. The straightening can be done only while the frame member is hot enough to show color, and as soon as the redness is lost the torch must be again applied to heat the bent section before any further work can be done. A block of wood may be interposed between the frame channel so that the chain or bar-loop at either end of the beam does not crush in the metal where pressure is applied.

### A Unique Forest Telephone.

A forest "ranger" walking through a western United States forest smelled smoke. He investigated. Presently, just ahead of him he saw thin smoke clouds arising. A fire! An American forest fire is a matter not to be trifled with. He rushed to the nearest telephone line, attached his portable telephone and rang. No answer. Again, and still no response. The men at the station had walked off and did not here the bell. In the ranger's telephone there was a Klaxon horn. He quickly connected it up and started it whirring and buzzing. The noise echoed and re-echoed through the forest, and in a few moments came over the wire. Fire-fighting help was quickly sent and the fire was put out before it had gained any considerable headway.

This combination telephone and signal horn is the invention of the United States

Forestry Service. It is made so compactly that it fits snugly in a box which the ranger can carry with ease. On the bottom shelf of the box there are six cells of dry batteries which furnish the power. On a top shelf of the box are found the transmitter and the receiver and on the middle shelf the Klaxon horn, which makes a terrific horn when in action. A special magneto furnishes either a direct or an alternating current. The alternating current is used for the ordinary ringing signal, and the direct current is used for operating the Klaxon horn. The box containing the entire outfit weighs less than thirty pounds and can be carried about conveniently.

### SINKING CAISSONS IN SHIFTING GROUND.

There is an electric light and power plant about 200 feet from the Patapsco River, near Baltimore, Maryland. A cable way carries the coal from the river to the power house, and coal is also stored in the space between the power house and the river bank. Recently the company started the erection of a new hoisting tower and bridge to handle coal, but the weight of the coal stored had started a movement of the ground toward the river, and it was realized that the construction of the tower foundation in this shifting ground would be carried on with difficulty. It was decided to sink caissons at an angle so as to allow for the movement of the ground, and this was done by suspending the caissons from a timber framework by means of cables. By letting out certain cables faster than others the desired tilt was obtained. After the caissons had been carried down through the shifting soil (a distance of over fifty feet) they were brought to exact plumb and the excavation proceeded under air through a twenty-foot layer of sand until hard bottom was reached.

ALFRED T. MARKS.

## NOTES.

The Administration Report of the Dhrangadhra State (Bombay Presidency) for the year ending the 31st March, 1919, says:—The industrial resources of the State are not at present great but their possibilities are very considerable. Dhrangadhra stone has for long been famous in Western India and a great stimulus to the quarrying of it has been given by the reduction of the Royalty on it and by the opening, in 1915, of a railway quarry-siding. It is confidently hoped that the transfer of the management of the State Railway to the Bombay, Baroda and Central India Railway, which is shortly to be effected, will result in the further development of the stone industry and traffic. The manufacture of Magnesium Chloride, Glauber, and Epsom Salt, on a large scale, however, still forms the subject of correspondence between the Government and the Durbar. As has been shown in previous reports, the State is most favourably situated for the manufacture of these and other products of salt required by the textile and other industries in India. The necessity for manufacturing these chemicals in India has been emphasised by the Report of the Indian Industrial Commission which shows that, though improvement has been effected under war conditions, much still remains to be done before the possibilities of these important products are exhausted. It has long been the ambition of Dhrangadhra State to obtain sanction to a scheme by which some of India's many deficiencies in chemicals may be remedied. The extent and gravity of those and other deficiencies of a like kind constitute, to quote the Industrial Commission, "a serious national danger," and Dhrangadhra only awaits the sanction of Government in order to develop its salt industry so as to help in removing that danger and to benefit the State as well as Indian industries. * * * The State is desirous

of securing to the Empire the benefits of the peace which has happily been attained; and in the development of its salt industry it very clearly sees the opportunity not only of helping to free India from the necessity of relying on foreign imports—and in this particular case of imports from Germany—but of playing a not unworthy part in the industrial renaissance of the country.

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The question of the possibility of manufacturing paper in Ceylon has been considered by the Industries Commission, but it is understood that so far no extensive experiments have been carried out with a view to discovering which trees give the best pulp and whether such trees exist in sufficiently large numbers, and are sufficiently concentrated in particular areas, to render the local manufacture of paper a paying industry. Almost any soft wood is suitable for the production of pulp, but one of the chief difficulties in Ceylon would appear to be, that most of the trees with soft wood grow principally in the wet zones where the land is already largely under rubber or some other product. The bamboo tree gives a pulp suitable for the manufacture of paper and, as a matter of fact, is extensively used for this purpose in India, the West Indies and elsewhere. But it is doubtful whether the bamboo exists in sufficiently large numbers in Ceylon to make the local manufacture of paper from this source a practical proposition. Writing in this connection the *Times of Ceylon* states that it is believed that there is a possibility that pulp suitable for paper-making could be produced here, compressed, and exported to India or elsewhere for conversion into paper. It is said that the manufacture of the finished paper product, though possible in the Island, presents considerable difficulties.

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A special committee of the Institution of Electrical Engineers of Great Britain has been formed to consider the revision of the existing rules for electric wiring in buildings. This committee is the outcome of a growing conviction that the high quality of British cables and accessories justifies a relaxation of the standards hitherto imposed. During the war an enormous number of army buildings have been wired on the surface and in other ways not consistent with standard British practice; and the experience thus gained will be turned to account in cheapening the cost of installation and materials. British manufacturers of wires, switches, insulators and other accessories will thus be led to expand the production of types which will be pecularly adapted to meet the needs of overseas markets. Satisfactory quality will be ensured by the National Electric Proving House which is about to be established in Great Britain, and which, as it were, will put the hall-mark of good design, material, and workmanship on every class of electrical apparatus, thus giving British productions the full benefit of the high reputation they have always held.

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We gather the following information regarding the several industrial concerns in the State of Baroda from its Administration Report for 1917-18. The Vaso Dyeing and Bleaching Factory was sent into liquidation, but the machinery was purchased by one Mr. Patel who has also purchased the building of the old leather factory where he proposes to set up the machinery. The Chemical Works at Navsari have changed hands, and the new proprietor, Mr. Randelia is making arrangements to continue the works. The application from a merchant of Damnagar for a lease of the Charakla creek in Okhamandal for the manufacture of alkali and other chemical products from brine and salt is still before Government, as the question of giving a monopoly requires careful consideration. A joint-stock company for the manufacture of Mangalore pattern

tiles has been started and the work of constructing the factory begun. Three other smaller factories for manufacturing similar tiles have also started work at Bilimora and Navsari. The manufacture of flooring tiles and terracotta has been undertaken by another concern on a small scale at Gandevi. In response to an application for a loan, two lakhs of rupees were sanctioned for the Shri Sayali Cotton and Jute Mills Co., Ltd., Sidhpur, for the extension of their factory.

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A Government of India Press Communique says :—Since the provisions of the Cotton Cloth Act were formally put into operation in February last, there have been no violent fluctuations in the price of cloth, the trend of which over the whole period has been in a downward direction. During the last few weeks prices have risen in Bombay, mainly as a result of increased demand due to the favourable monsoon conditions, but indications point to an approach to a level which may be regarded as normal in post-war conditions. In these circumstances and in view of the fact that, as stated in a reply to a question asked by the Honourable Maharaja Sir Manindra Chendra Nandi in the Imperial Legislative Council on September 25th, the Governments of the United Provinces and Bihar and Orissa, in which the shortage of cloth was originally most acute, have still large stocks of standard cloth on hand and that arrangements has been made by the Controller of Cotton Cloth to ensure a supply of standard cloth to the Punjab and Assam where there is still a demand for it, the Government of India have decided that Cotton Cloth Control should be placed in abeyance for the present. The Cotton Cloth Act will, however, remain in force and the provisions will again be pnt into operation should speculation in cloth or any other cause force prices up to such a point as to render this desirable. Mr. F. Noyes, I.C.S., Controller of Cotton Cloth, has joined the Indian Sugar Committee as Vice-President. but will remain in charge of the work connected with Cloth Control until it is finally wound up at the end of November. A full report on the operations will be published shortly.

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The Madras Government have sanctioned a sum of over two lakhs of rupees for the construction of the buildings for a cattle breeding station at Chintaladevi in the Nellore district. The station is situated in the tract which produces the Ongole breed of cattle. The importance of this breed to the Presidency is well-known. Most of the better class milch cows in Madras and indeed in the greater part of the Tamil country have been bred in this tract and the Dutch and American Governments send their agents to Nellore to buy Ongole cattle to improve the breed in Java and the Philippines. Of late years there has been a complaint that the cattle-breeders have been tempted by the high prices to export the best of their stock and that the breed is consequently deteriorating. The object of the breeding station now to be established is to ensure the maintenance and improvement of the breed without interference with the profits which accrue to the ryot from the export trade. About 850 acres of land have been set apart for the breeding station ; part of this area is commanded by the new Hopad reservoir and there will therefore be no difficulty in maintaining the stock even in years of drought. It is intended ultimately to maintain a herd large enough to enable the Agricultural Department to send out 40 first class bulls each year; these will be disposed of in the manner which seems best calculated to improve the breed throughout this breeding tract while a fair revenue may also be expected from the annual sales of superfluous and low grade stock.

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The prohibition on the export of oils and oil seeds from India was removed with effect from sixth December.

## GLEANINGS.

Vigorous efforts were made at the beginning of last year to increase the capacity of the Japanese mills, but the difficulty of obtaining the necessary machinery from England hampered the plans of the manufacturers to a great extent. Still, in spite of all hindrances, the Japanese managed to do a great amount of trade with India. The total exports to India from Japan managed to do a great amount of trade with India. The total exports to India from Japan last year reached a total value of £22,404,000 compared with a little over £3,000,000 in the year before the war. The Foreign Trade Board's figures show that the total value of the cotton fabrics exported from Japan last year was, including the exports to China, £23,800,000.

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It is stated that the question of utilising *the abundant supplies of dye-producing* woods found in Ceylon is just now engaging the attention of the authorities. One of the chief dye producing wood is the Japan wood, which has recently been exported from Ceylon in large quantities. During the war, when German dyes were no longer available large quantities were exported from Ceylon to India and Japan.

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Mr. Montagu, Secretary of State for India, replying to Sir J. Rees, said:—Subject to the settlement of some important matters of detail the Government of India have been authorised to proceed with legislation for enabling the three Presidency banks to the amalgamated. It is contemplated that under the proposed scheme the amalgamated bank would be the custodian of the Government balances in India, and would undertake to open 100 new branches in five years.

To-day between 5,000,000 and 6,000,000 motor vehicles use American heighways, according to *Motor Travel*. Ten per cent of these vehicles are motor trucks. Instead of constituting practically 100 per cent of the traffic as in 1903, horse-drawn vehicles at present amount only to 5 to 20 per cent of the total number of vehicles on highways outside.

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A new soap for the use of cotton mills known as Luopon Soap is being placed on the market by a Manchester firm. The makers claim that exposure to the atmosphere does not deteriorate the product, whereas many products of this type previously manufactured lose from 10 to 30 per cent of their most valuable properties in the course of a few hours if left in an open vessel. Therefore, Luopon soap keeps better and gives more even results when used out of the cask, the last portion being equal to the first portion. In the dyeing of cotton, it is applied by the addition of ½ to 1 per cent of the product to the dyebath so as to ensure a more rapid soaking and a better penetration of the goods. In many cases the shades become deeper and brighter, and the goods have imparted to them a soft, full handle. In the bleaching of cotton the addition of ½ to 1 per cent of this soap to the caustic boiling-out liquor greatly helps in producing an even bleach on both yarns and pieces. The product is also of service as a constituent of many finishing mediums for various purposes. It is claimed to increase the stability of the finish by precluding the formation of mildew.

## SPEECHES AND PRONOUNCEMENTS.

### THE INDIAN SUGAR COMMITTEE AIMS AND OBJECTS.

In opening the Cawnpore session of the Indian Sugar Committee, Mr. James Mac Kenna, C.I.E., I.C.S., Agricultural Adviser to the Government of India and the President of the Committee, said:—

Now that the full committee is assembled, I think it desirable that some general statement of the aims and objects of the Indian Sugar Committee should be made, in order to correct certain misapprehensions, which appear to prevail regarding the scope of its enquiries. One had hoped that the labours of the Indian Cotton Committee would have convinced the public that the method of investigation by a committee can be applied with some measure of success to any agricultural question, or even to any particular agricultural crop. The questions that one has to meet are, what are you going to make the cultivator grow—more sugar-cane? Similar questions were addressed to us when we started the cotton enquiry. We are not going to force the cultivator to do anything that he does not want to do. But we propose to investigate the problem of sugar in India in its broadest aspects, to see whether the present methods of cultivation cannot be improved so that the cultivator will get a larger yield from the plot of cane, which he at present cultivates, and also to ascertain whether by an improvement in his manufacturing processes, he cannot get a better outturn of sugar or *gur* from his cane.

The Empire is crying for sugar. Only a day or two ago a *Reuter* telegram appeared in the papers, which stated that the Royal Commission on Sugar Supply has announced that the world supply of sugar is insufficient to meet the demand, and that, accordingly, the retail price of sugar will be increased one penny per pound from the 3rd of November with a view to economising consumption. The quantity of sugar, which can be imported into the United Kingdom in 1920 will be at least half-a-million tons less than in 1919. If, therefore, India can become, as she was in the past, self-contained as regards sugar, her present large imports might be utilised by other parts of the Empire. It is even possible that in the future she may again become an exporting, instead of an importing, country. Our labours are, therefore, directed in the first instance to ascertaining whether it is not possible to improve the position of the existing cane grower by bringing to his aid methods of cultivation or of manufacture which have been found to give better results than the primitive ones which he has followed from time immemorial. It will also be our duty to investigate the probable effect of the introduction of any schemes of irrigation, both as regards existing areas under sugar-cane and areas likely to be brought under sugar-cane as a result of the provision of these facilities, care being taken that the economic balance between sugar-cane and food crops is not unnecessarily distributed. But, apart from the existing areas under sugar-cane, there are vast tracts of unoccupied waste land in India, which we venture to believe could with advantage be placed under sugar-cane cultivation. In such cases it will be for consideration whether the best line of development lies in the direction of central factories or in the encouragement of small local manufacturers. If the former, we shall have to decide whether it is preferable to recommend large grants of land for central factories, which will be worked either by a system of tenancy or by hired labour. A reference to the financial papers of Bombay and Calcutta indicates that there is a vast amount of Indian and European capital awaiting investment, and the prospectuses of companies also reveal the fact that Indian and European capital is coming into closer relationship than has been the case in the past. It will be noticed that on nearly every Board of Directors, Indian and European firms are represented. But, in dealing with the proposition on this larger scale, the committee will not lose sight of the economic and social welfare of the actual cultivator, and such questions as co-operation or profit-sharing will be brought under investigation.

I wish it to be distinctly understood that it is not our intention to bring any pressure to bear on the cultivator if he does not desire to undertake cane cultivation but, if we can show that cane cultivation is profitable, and if it does not compete with other more essential food crops, I venture to hope that the results of our deliberations will be to induce him to consider the desirability of taking it up. As I have said before, we hope as a result of our enquiries to recommend methods of cultivation and of manufacture which will pay better than those now followed. Incidentally, we shall have to consider what additions to the existing Agricultural Departments are necessary to give effect to our agricultural recommendations. It will also be our duty to consider to what extent, if any, the imposition of a protective tariff is desirable, if not parmanently at least until the industry has been placed on a sound footing. We fully realise that owing to the force of local sentiment in favour of hand-made sugar its manufacture must continue to exist, but we hope it will not be found impossible to make recommendations which will place it on a sounder footing. With the devolution to the provinces of agricultural policy, which is inevitable as a result of the Reform Scheme, we hope to be able to lay down for sugar, as the Indian Cotton Committee did for cotton, a general policy for the whole of India, which the provinces, we venture to hope, will adopt with such modifications as local conditions may necessitate. Whatever devolution there may be India will always think imperially, and Provincial Governments will loyally support any general lines of policy which are likely to contribute to the imperial gain. That is why it is desirable that the sugar position should be reviewed from a wide standpoint, *i.e.*, from the All-India point of view.

# TOPICS FROM ECONOMIC PERIODICALS.

## SOAPS FOR COTTON GOODS.

We take the following from *Pascall's Textile Journal* :—

The fibres in cotton and linen goods contain very much less impurity than wool and silk fibres and consequently the amount of soap used in this industry is much less, being applied only to the fabric. It is employed in three different operations: cleansing the cotton goods preparatory to dyeing, during and after dyeing, and in calico printing.

Since dilute caustic alkali has no harmful action upon the cotton fibre, the soap used in cleansing and preparing cotton goods for dyeing need not be neutral; in fact, slight alkalinity assists the cleansing. Any curd soap made from tallow, or tallow with a small proportion of cocoanut oil, may be used for the purpose.

### Dyers' Soaps.

Soap is used to a fairly considerable extent in the dyeing of cotton goods. In the dyeing of many direct colors soap is frequently used to the extent of 3 to 3½ lb. per cwt. of cotton which is dyed.

The turkey-red, alizarine-red, and para-red dyer uses soap after dyeing his cotton goods. The object is to bring about a brightening effect on the color, while there is no doubt the operation tends to fix the color on the cotton better. The soap affects these objects by first removing any excess of dyestuff from the cotton, which has not been united with the mordant that was first fixed on the cotton, and which excess of dyestuff, if left in, would dull the color and might subsequently give rise to stains. Secondly, there is no doubt that the soap has a tendency to enter into combination with the dyestuff on the one hand and the mordant on the other, so that a triple combination of soap, dye, and mordant is fixed on the cotton, which is faster and brighter than a simple combination of dye and mordant.

The soaping is generally effected by working or passing the dyed goods through a soap liquor of a strength of 2lb. per 50 gallons of water at about 150 deg. F. The best soap for this purpose is a green olive-oil soap, made from sulphur olive-oil, and known as Marseilles soap. This is made to contain 62 to 64 per cent of oil, with a corresponding proportion of alkali and water. Olive-oil soaps are fairly soluble, and leave no unpleasant odour behind them. Palm-oil soaps also work well; they are not so soluble as olive-oil soaps; they have a pleasant characteristic odour, and do not go rancid. Tallow soaps have been and are sometimes used, but they lack solubility, and have some tendency to go rancid, hence their use is not advisable.

### Calico Printers' Soap.

Calico printers use soap to a considerable extent in the final operations of washing and clearing the printed cloths. The soap is made into a liquor of a strength of approximately 1½ lb. of soap to 50 gallons of water; some printers will use a stronger liquor, others a weaker liquor. Then the dyestuffs with which the cotton cloths have been printed have some influence. Thus alizarine and alizarine colors in general require a stronger soap liquor than do basic dyes, like methyl violet or mythylene blue. Mordant dyes, like *alizarine yellow, chrome red, etc.*, take a medium strength of soap liquor.

The function of the soap is not thoroughly understood. No doubt it plays several parts, which will vary according to the dye or dyes that have been printed on the cotton. In all cases it has a clearing action on the gum or starch thickening used in the composition of the printing pastes, facilitating the solution of these, and therefore their removal from the cloth. In the case of alizarine and mordant dyes in general, it has a decidedly brightening and fixing action. Probably this is brought about by a removal of excess of dyestuff that has not entered into combination with the mordant, thus helping to brighten the color, while the fatty matter of the soap may enter into combination with the mordant, and thus tend to fix it on the cloth, at the same time bringing about a more complete combination of mordant and dye, a triple compound of fat, mordant, and dye being formed as a kind of lake pigment, which is fast and bright.

In the case of basic dyes probably the soap may remove traces of dye which has not properly entered into combination with the tannin-antimony mordant used, and so tend to make the finished print faster to washing. Possibly also some of the fatty matter of the soap may enter into combination with the antimony, etc., and help to render it more insoluble, and in that way printed fabrics may be produced which are faster to washing than would otherwise be the case.

Soaps which are best adapted for treating printed calicoes and other fabrics should be easily soluble in water, and therefore oil soaps are best. They should be quite neutral (as any free alkali would be liable to change the tints of some colours and make others run), must contain no rosin, and must be such as do not leave any objectionable odour on the material, hence cotton seed and maize-oil soaps should not be used.

The question of solubility of the soaps used with calico prints is a very important one, for the more soluble the soap the more fluid is the liquor it makes, and the more easily will it penetrate into the fabric as the latter passes through the soap liquor; while, further, the temperature of the soap-bath need not be raised so high. The best and the most easily soluble soaps would be, of course, neutral potash soft soaps, and such are even used by some calico printers for their best and most expensive prints. Calico printers' soaps should be quite free from fillings of any kind. Some of them may contain 1 to 2 per cent of common salt or sodium sulphate, the presence of which is of no practical moment and cannot always be avoided.

While hard soaps may be used for soaping cotton, silk, and half-silk fabrics, for soaping woollen and half-woolen cloths (delaines,) it is preferable to employ soft potash soaps, for these tend to more thoroughly preserve the lustre and pliability of the wool fibre. Such soaps must be quite neutral, and contain no free fat.

## CANADIAN CHEMICAL INDUSTRY.

A Correspondent writes to the *Times* (Trade Supplement):—

The achievements of Canada in the development of the chemical industry during the past four or five years have been so remarkable that the question may well be asked whether the country is likely in the future to continue to progress at the same rate.

In a survey of what has been done, Mr. S. J. Cook (Chemist in Charge of the Food and Drugs Laboratory of the Department of Trade and Commerce, Canada) remarks that "the energy and enthusiasm of the chemists of America is notable, and if manufacturers representing the financial and natural resources of the country, and the chemists with their scientific training urging their imagination and initiative, can pool their abilities for the common good, there will be built up in Canada, in the years to come, a chemical industry of which not only the chemists and the manufacturers, but the people will have just reason to be proud."

This survey occurs in a directory of the chemical industries in Canada issued by the Dominion Bureau of Statistics, and shows that at the beginning of the present year there were 634 plants operated by nearly 500 Canadian firms.

### TENFOLD EXPANSION IN SEVEN YEARS.

The enormous expansion of the industry in Canada cannot be better illustrated than by quoting the export figures for the fiscal years 1912-19:—

DRUGS, DYES, AND CHEMICALS.

| Year ended March 31. | | Dollars. |
|---|---|---|
| 1912 | ... | ... 1,677,216 |
| 1913 | ... | ... 1,800,437 |
| 1914 | ... | ... 1,730,203 |
| 1915 | ... | ... 3,543,701 |
| 1916 | ... | ... 6,449,145 |
| 1917 | ... | ... 9,218,415 |
| 1918 | ... | ... 14,207,609 |
| 1919 | ... | ... 17,053,074 |

Mr. Cook points out that not a few people still hold the opinion that we must look back to the period before the war as the foundation upon which to base our calculations for the period upon which we are entering, and he agrees that to a certain extent this is true. At the same time, he says that it must be remembered that many other industries have laid aside their peaceful activities, and that the extent to which they will return to their pre-war production is problematical. "The country is filled with new ideas, and cannot ever be just the same again."

The factors that will count in the progress to be made in the Canadian chemical industry are the co-operation of the representatives of capital and the support of popular sentiment. The influence of the latter as a force in the country is, as Mr. Cook observes, often over-looked, and he thinks Canada might with advantage take a page from the German note-book, for "in every land, where an industry of national importance is to be built up, the people must be educated to its importance and value." Supporting this view, he quotes from the report made by the Alien Property Custodian of the United States on the "Chemical Industry," as follows:—

It seems to have been regarded as the duty of a good German chemist in the United States to preach the doctrine of the invincibility of the German chemical industry, the impossible difficulty of the processes of many important dyes, and the hopelessness of procuring the necessary technically trained men and skilled labour outside of Germany. If Canada listened to doctrine of this sort she was not alone in doing so, but her successes in the chemical field during the war have done much to instil ideas which lead a vigorous people to the accomplishment of great deeds.

### SHAWINIGAN ACETIC ACID PLANT.

Probably the most conspicuous development in Canada was the erection of the world's largest

glacial acetic acid plant built for war purposes at Shawinigan, Quebec, where an entirely new process beginning with acetylene was carried out. Acetone, paraldehyde, crotonaldehyde, mercuric oxide, and manganese acetate are also produced, while magnesium, of a purity ranging from 99 per cent to 99.9 per cent is made electrolytically from its fused salts. At Niagara Falls there has been an adaption to the manufacture of fixed atmospheric nitrogen as cyanamide, the lime-nitrogen fertilizer, and its conversion into ammonium salts. Among electric-furnace products which are native to Niagara and Shawinigan are aluminous abrasives, ferro-silicon, &c. As Mr. Cook says, it is in connexion with the utilization of Canada's water-power that the most spectacular development has taken place, but progress does not depend upon that factor entirely.

In the manufacture of munitions of war there arose a demand for acetic acid and acetone which stimulated the wood distillation industries of the country, with the result that not only was the output of these products greatly increased, but acetic anhydride, methyl acetate, and special grades of acetone-alcohol and acetone oils were added to the list of products.

### COAL-TAR DYE PRODUCTION.

Before the war Germany supplied approximately nine-tenths of the world's needs of coal-tar dyes alone, and while Mr. Cook states that it is not probable that a coal-tar dye industry will be built up in Canada, such as have been started in Great Britain and the United States, some coal-tar medicinals have been made in Canada and he thinks there seems to be a field for this line of work. As he points out, salicylic acid and the well-known acetyl derivative, better known as aspirin, are now made in Canada, while coumarin, benzoic acid, benzoate of soda, and benzaldehyde are further names in the list of new Canadian chemicals. New disinfectants, closely resembling former German products, are appearing from Canadian factories, and the distillation of coal-tar is being more extensively carried on. It is pointed out that "a further use of coal-tar products is in the preservation of wood by creosoting and in the manufacture of tarred felts, as well as the various grades of tar and pitch used in roofing, paving, waterproofing, and road treating. These products will need considerable advertising in order to bring to the attention of the Canadian people the fact that quantities of these supplies are now produced in this country."

War needs led some of the older houses into new lines, such, for instance, as the manufacture of oleum for use in the making of high explosives; new acid plants have sprung up, and there are now largely increased facilities for the production of sulphuric, nitric, and mixed acids. Soda ash is now made in Canada, and one firm produces hydro-fluosilicic acid, another picric acid, and another plant makes molybdic acid as well as its ammonium salt. Two Canadian houses list chlorates of soda and potash, one of which also makes phosphorus, and the other perchlorates in commercial quantities.

### ELECTRO-METALLURGY.

In regard to metallurgy, and particularly in electro-metallurgy, Mr. Cook reports much progress:—

Silico-manganese, for use in the manufacture of manganese steel, and high-grade ferro-silicon for the use of the British Admiralty as a source of hydrogen, were new lines developed by one firm as a war effort. Many new electric furnaces have been installed, and the immensity of the output of steel under the direction of the Imperial Munitions Board is so well known as not to need more than passing mention here. The refining of Canadian nickel in Canada is at last being undertaken, and two large plants are under construction for this purpose. The refining of graphite has been the subject of considerable thought and expense, but so far has not been carried on with commensurate success. One firm expects to commence operations shortly, and another is under consideration.

During the war Canada built up large industries employing thousands of workers. Many of the plants operated by the Imperial Munitions Board have, however, already been closed down and in some instances dismantled, and Mr. Cook rightly remarks that "unless many of these factories can find peace-time uses for their war-time products, much of the advantage we have gained in the way of commercial chemical progress will be lost." The Dominion has, however, many plants devoted to the chemical industry which are still operating, and there is room for yet others.

# ECONOMIC NOTES.

## INDUSTRIES AND COMMERCE.

### Industries of Western India.

The following extracts from the Annual Report of the Director of Industries of the Bombay Presidency for the year 1917-18, give a "resume" of the work done by the Industries Department in connection with the chief industries examined:—

HANDLOOM WEAVING.

This department was handed over by the Registrar of Co-operative Societies from the 1st of April, 1918, and has continued to be run on the old lines. Certain changes are at present under consideration, but I am not entirely satisfied that the existing organisation, useful as it has undoubtedly been, is the most economic possible. Detailed proposals will be submitted after further discussion, but generally I am inclined to think that schools should be run by local bodies with the assistance possibly of grants-in-aid, as is the case in Madras and elsewhere. The present cost for a school is far higher (Rs. 1,500 per annum) than was originally contemplated by Mr. Pomfret (Rs. 600 per annum with a possibility of being self-supporting in a year). Demonstrations have continued under Mr. Wagh, but here too I consider that a change of method may be beneficial. I found that in the Central Provinces where also the main line of work is the popularisation of a simple form of fly-shuttle loom, they employ demonstrators on Rs. 15 per month only and give them a bonus of 8 as. on every loom which they introduce in any area. The manufacture of these looms has been taken up, I find, in many weaving centres in the Bombay Presidency, and I think, that with the assistance of a weaving carpenter, it should be possible to encourage such manufacture at new centres. The number of demonstrators can thus be largely increased without any extra business and they will become selling agents to the manufacturers. It is mainly a busines proposition and should gradually be treated more and more as such. On the other hand, I am of the opinion that more should be done by the Department in introducing new patterns, and above all in creating a local demand before teaching new methods. The schools have suffered like other institutions from the prevailing epidemic of influenza and the weaving industry generally has been hampered by the high price of yarns, the uncertainty of the market, and the difficulty of obtaining dyes. I have noticed in the course of my tour some interesting small power installations in various weaving centres, and I propose to investigate the limits within which such transition is desirable and should be encouraged for the weaving of coarse cloth.

POTTERY.

Besides the testing of clays, drawings for kilns, factory buildings, and staff quarters for the proposed new Pottery Demonstration Factory were prepared and notes and estimate for the scheme were made and forwarded to the Director of Industries by the Superintendent of Pottery. Practically the whole of the Thana District within one mile on both sides of the country adjoining the road from Thana to Belapur, and from Thana to Uran *via* Panvel, have been minutely examined for clay deposits.

The country within a two miles radius of Thana Road Station in the Lakhtar State of Kathiawar was surveyed by the Superintendent of Pottery, and very valuable clay beds, especially fire clays, were exposed.

The manufacture of bricks, and to a small extent roofing tiles, is carried on in different parts of the Presidency. No other branch of the Pottery Industry has yet been attempted in Bombay, notwithstanding the abundance of raw material, but it is hoped that when the Demonstration Factory, for which proposals are being prepared, is established, the commercial possibilities of various new lines of work will be indicated and a practical training given to pupils who wish to learn the various processes in connection with the manufacture of earthenware.

The brick industry is flourishing but the quality of the article leaves much to be desired, and it has been demonstrated that a far superior brick to the ordinary Kalyan brick can be made from material found in the vicinity of Bombay. The lime and sand brick works at Marwa in Salsette and the Western India Brick Company's Works at Worlee also show that the brick industry is attracting capital and brains at the present juncture.

The roofing tile industry requires encouragement and guiding along right lines of manufacture and management. Some progress has been made in the Belgaum District where capital is being invested and Mangalore workmen employed, but larger commercial ventures are in view in the neighbourhood of Bombay City, and considerable progress may be shortly expected.

OILSEED CRUSHING.

The production of vegetable oils in this Presidency has increased of late years. The difficulty, however would appear to be that the right type of machinery is lacking and that at present installed is not properly worked. Batteries of rotary ghanies are the commonest form of advance on the old bullock press and

the American Anderson's expeller, which, however, *is sold at too high a price and is not suitable for all* kinds of seeds, also has its devotees. It is understood that the American oilseed industry is in a similar plight, and everyone is looking for the ideal method of oil extraction. The method which has the most universal application in industrialised countries is undoubtedly the hydraulic press, particularly the large and more powerful types. In this way large quantities of seeds can be pressed at one time. This is a matter of commercial importance, since fresh seeds arriving on the market can be dealt with at once. Again better methods than those at present in use for heating the seeds require to be tested, as the use of steam has several drawbacks. The introduction of more efficient methods of decortication, deshelling and washin of seeds would result in the production of purer articles and effect a saving in labour. Practically all the problems connected with the oilseed industry in India are mechanical ones and require the co-operation of expert engineers and oil chemists. With regard to the better utilisation of the oils, methods of purification should be adopted, and such oils would then be of value as edible oils.

The whole question of the use of oilseed cake for human and cattle food depends on the use of proper machinery, and this will effect an improvement on the yield of oil from these oilseeds, The proper decortiation, cleansing and pressing of cottonseed is another subject worthy of considerable attention. The oil when purified would be of great value as an edible oil, and the resulting cake should have a prominent place as a highly nutritious food-stuff. Finally, a great future awaits the Indian vegetable oil trade *with the introduction of hydrogenation, resulting* in the production of solidified oil. The saving in transport alone would be enormous. apart from the production of a wholesome and efficient substitute for 'ghee.'

DAIRYING.

This question is largely one of an agricultural nature, but there is a distinct chemical side which awaits development. Buffalo milk yields a large quantity of fat, and after this has been removed, the separated milk can be used for the preparation of casein, and also milk sugar. Casein is an article of considerable commercial importance, and the Casein Company of New York, alone would monopolise all the casein produced in India. The technical applications of casein are almost unlimited, and hence the demand for casein in America and England. Milk sugar (Lactose) is also a valuable product, and it would appear from observations made that buffalo milk is particularly well adapted for yielding a good quantity of this sugar. It enters very largely into all forms of infant's food, and commands a high price, *especially when pure.*

For these two products alone. apart from the question of butter and cheese-making, the dairying industry merits encouragement and development.

BITTERNS.

The proper utilisation of bitterns has stood apart as the prime subject of investigation by this Department. The reason for this is that Kharaghoda offers such a promising field for future industrial development. There are of course considerable obstacles in the way of commercial developments, chief amongst them being fuel, water supply, labour and transport.

To overcome the first we attempt to utilise the *natural heat of the sun* as far as possible, and to this end special pans are being constructed. This will, we hope, reduce the consumption of both fuel and water. The transport difficulty is to be averted to a certain extent by the introduction of a pipeline *to convey the bitterns by mechanical means to the* factory. There will thus be a saving of labour, which is also a problem of no small magnitude in an isolated place like Kharaghoda. To show the possibilities of the bittern industry, I append the following figures showing the quantity of salts at present wasted in India:

Magnesium Chloride, 193,000 tons.
Magnesium Sulphate, 127,000 tons.
Potassium Chloride, 20,000 tons.
Bromine, 1,800 tons.

FISHERIES.

A general survey of the conditions obtaining along our coasts was made in the hot weather. There is *obvious scope for improvement in the present methods* of curing fish, and the possibilities of canning on the lines adopted in the Madras Presidency must be tried and demonstrated. As compared with Madras, the supply of sardines except in the very south of the Presidency is too uncertain for any extensive operations. But the catches of mackerel (scomber microlepidotus) are considerable and this fish has been successfully canned in Madras. A large trade is done particularly from Karachi in the sounds of the gol fish (Sciæna sina). We still export these for the manufacture of isinglass, and any visitor to the Crawford Market can see these sounds being collected in the fish market, while next door the manufactured isinglass is offered for sale. The possibility of the manufacture of the commercial article should be examined. A very large revenue is also derived from the traffic in sharks' fins which are exported to China as an article of food. So little is known at present about the possibilities of our fisheries that it is useless to say more for it in advance. Mr. Walke

has been devoting part of his time to examining local conditions, chiefly along the Kanara and Ratnagiri coasts and will shortly, it is hoped, be appointed as a wholetime officer under the Department. The necessity for scientific investigation as well as organisation has not been overlooked, and proposals will be submitted shortly,

GLASS

War conditions while generally hampering industries, have temporarily assisted others through restrictions on freights, and glass is one of these. Five glass-making concerns have started in Bombay City during the war, and in spite of difficulties in connection with coal supplies, have met to some extent the local demand for cheap lampware in particular. The factory at Sunth Road closed during the year under Report; and its position at a distance, both from markets and fuel supplies, was obviously not in its favour. The glass works at Talegaon continue to work on altruistic lines and supply blowers to many of the new works. Some progress was also made by the Ogale Brothers at Karad. Nearly all the glass works in this Presidency obtain their supplies of sand from Naini near Allahabad. The sand is suitable, but it is quite possible that nearer supplies of equal value will be discovered. Two of the glass works of Bombay are under Japanese managers, and two are attached to established trading concerns in glassware. All use direct-fired Japanese pot furnaces, and their consumption of coal, even allowing for the bad quality of some of the coal supply, is uneconomical in many cases. It is possible that in the future oil may be employed with success, but the supplies at present are too limited and freights too high to bring oil within the limits of practical politics. Probably one of the greatest needs of the glass industry at present is the provision of an expert who can construct furnaces on the regenerative or recuperative principle for the economic melting or glass.

OTHER INDUSTRIES.

The possibilities of sugar manufacture are shortly to be tested by a local syndicate in the Ahmednagar District, where a suitable block of land on one of the new canals has been acquired with a view to its lease to the syndicate. The high price of Deccan gul makes the price of cane far higher than it is in Behar, and one essential for success is the growth for the factory of its own cane by improved methods. The syndicate's operations are watched with considerable interest and must prove of the greatest value as a lesson in the economical utilisation of water and manure, if for no other reason.

The Department is mainly interested of course in nascent industries. Occasionally a moribund industry must be examined if only to discover whether it should be regarded as a shocking example or can in any way be revitalised. The Match industry in this Presidency is a case in point. Leaving aside derelict machinery, I have inspected one running concern and also made enquiries about their past experiences in pre-war conditions. Wood of course is the main difficulty, and it is exceedingly doubtful whether a really satisfactory wood for splints can be found in sufficiently large quantities and concentrated within a reasonable area to make the manufacture of splints a possible commercial undertaking. The common silk cotton tree (Bombax Melbaricum) provided a good enough timber for the boxes. But even if obtainable in specially large quantities for commercial purposes, the wood is useless for splints The greatest success in the past seems to have been obtained with imported splints from Sweden, which is not encouraging. As a shocking example to point the moral of necessary preliminary enquiries and proper consideration of all the factors underlying commercial production, the Match industry on this side of India has its uses.

To turn to brighter subjects, Brush making has made some progress. Many of the materials such as bristles and fibres have to be imported at present, but it is possible that substitutes may be found for some of these. The class of articles produced has undoubtedly improved.

Button-making has attracted attention in the past and may command more notice in the future. The raw materials are available in the shape of bone and horn, to say nothing of the 'boka' nut found in the south coast of Kathiawar, and the tali palm seeds available in Kanara which are already used for making coat-buttons, studs, etc., Mother-of-pearl from the Persian Gulf comes into Bombay normally, and could be made up easier here than at Dacca where the industry at present flourishes. The only buttons being made at present on this side are stamped out of aluminium sheets. The Department has taken over temporarily certain buttonmaking machinery and proposes to experiment and examine the possibilities.

In the absence of any available expert, no experiments have been made with tanning on this side of India. The experience gained in the Dharavi Tanneries working under the Munitions Board, seems to show that under suitable direction considerable progress might be made. Experiments on a large scale have been carried out at Maihar in Central India under the Munitions Board and their results are certain to be interesting and helpful.

Leather belting is made in Bombay, and its suitability to compete with the imported article is under investigation.

Roller skins, picker-bands. and pickers, have also been manufactured, but are not yet up to the required standard. It has been argued that English pickers are superior, because they have been seasoned for six months or more in sperm oil, but I find on enquiry that the mills in Bombay do not consider the seasoning sufficient and adopt their own measures even with the English article. It is always an attractive proposition to try and encourage the manufacture of some article in common industrial use, but unless large stocks of a thoroughly adequate article are carried, industrialists naturally decline to run any risks and prefer to import something on which experience teaches them that they can rely.

In connection with the forests, a few small matters engaged the attention of this Department. The undoubted possibilities of the salai trees in Khandesh to which Mr. Pearson called our attention sometime back, are to be further investigated. As pointed out in the Industrial Commission's Report, these Indian turpentines differ from the ordinary commercial variety, and it is possible that by special treatment still more valuable products will be obtainable. There is still, I believe, a little more laboratory work to be done before establishing a small plant on a commercial scale for demonstration purposes, and this is being undertaken. Experiments are being made under the Conservator of Forests, Southern Circle, to test various kinds of woods for the suitability for cask-making, and an ingenuous device has been designed in Bombay for cutting cask staves. The distillation of rosha oil by steam should by now have been a *fait accompli*, but there have been serious delays in getting the plant made.

Lastly, various small enquiries and indents from the Munitions Board have been attended to so far as possible with the inadequate staff at my command. For this, as already noted. special war conditions have been entirely responsible, and little more has been done than to survey the general field and give assistance wherever possible and endeavour to ascertain where help and advice can be most profitably employed for the future.

## SILK IN SWITZERLAND.

There is no improvement in the situation of the silk industry. This industry is at the moment completely isolated in the international market. All exportation, even to the neutrals of Northern Europe is completely suspended, and the manufacturers have been obliged to limit their production. Many factories are threatened with a complete stoppage.

The difficulty arises chiefly through the impossibility of obtaining raw material from foreign countries. At the end of the War the general opinion was that the prices of raw materials would automatically decrease. This led to the failure to buy sufficient material through the fear of serious loss. In this way the silk manufacturers ceased entirely to import raw material.

Italy is the chief furnisher of raw silk to Switzerland, and during the War the obstacles in the way of obtaining supplies from that country have been almost insurmountable. The telegraphic service was suspended, the frontier closed for weeks together, a period of 15 days was necessary before a letter reached its destination, and transport was defective. In the first few months of 1918 a legal action was started against the "Societa per la Filatura dei Cascami di Seta," as a consequence of which several people connected with the silk industry in Italy were arrested. This was the opening of a virtual war against the silk industry in that country. Black lists were established, on which figured Italian firms dealing in raw silk with Swiss houses in Italy and in Swiss manufactures. The supply from France was more satisfactory, although the French black list system operated with some amount of hardship in the case of several Swiss silk firms.

After the Armistice the Italian Government instituted a monopoly of Italian raw silk, which was vested in the State administrative "Ufficio d'Acquisto delle Sete Itallienne." The object of this policy is to maintain the prices at a figure eminently favourable to the Italian industrial interests. Swiss manufacturers are disposed to regard this measure favourably at present, as a possible means of maintaining prices at the present level in the Swiss as well as the Italian market,

Large stocks of silk are at present lying in Italy waiting for export to Switzerland, but business is hindered by the regulation that foreign buyers must pay in advance.

## QUALITY OF AMERICAN DYES.

In a report issued to the stockholders of the American Chemical Foundation a claim is made in favour of the superior quality of American dyes. The total American output of dyes in 1917 is valued in the report at 57,796,228 dols., and that of 1918 at 83,095,404 dols, During 1918 the export trade grew rapidly, the total exports of dyes for the fiscal year amounting to 16,921,388 dols. In June, 1919, aniline dyes valued at 743,476 dols., were cleared for export from the port of New York.

The present strong American demand for Swiss dyes is accounted for in the report by the fact that most of the vat dyes are not manufactured in America in any quantity, but it is stated that the six months' supply of German dyes, permitted by the Government to come forward under the supervision of the War Trade Board, is expected to remedy some of the defects in the vat dye situation. Meanwhile, three different plants are manufacturing indigo in quantities, and are promising other vat dyes in the near future.

In regard to the control of dye factories in the occupied areas in Germany, a resolution was adopted by the dye section of the American Chemical Society that an urgent request should be made to the President that America should have her share in the operating control of these factories, and that qualified representatives should be stationed there, the information gained to be used for the benefit of the American industry.

It was also resolved that as the manufacture of dye from coal tar distillates involves the same process and material as that used in the manufacture of explosives and poison gas for military purposes, the question of the importation of dyes and bases of intermediates be made a military question, on the ground that importation is a menace to the possible future defence of the country, as it fosters foreign industries which would furnish an enemy with munitions of war, and discourages the development of home industry essential to defence.

Among other resolutions passed was one endorsing pending legislation to establish an independent Patent and Trade-mark Office, and a United States Court of Patent Appeals at Washington, and one protesting against the printing on hotel laundry bills of announcements to the effect that no responsibility would be assumed in caring for guests' laundry, owing to dyes.

A prominent American manufacturer of cloaks and dyes, writing recently to the "Daily News Record," does not agree with some of the claims advanced in the above report. He asserts that the public demands fast dyes, and manufacturers will soon be tired of employing dyes which will not give satisfaction.

## INDIAN CURRENCY.

### Stabilizing the Rupee.

Mr. Gilbert Slater, Professor of Indian Economics in the University of Madras, writes to the "London Times" :—

May I beg for carefull consideration of the proposal which I have been urging in India, that the rupee be stabilized at its present value of 2s. by making £1 currency notes legal tender in India at Rs. 10 and 10s. currency notes at Rs. 5? The bearing of this proposal on the American exchange makes it necessary that it should be dicussed from the British as well as from the Indian point of view.

India is this year blessed with a very good monsoon, and will have in all probability a great exportable surplus of her chief products—wheat, rice, tea, vegetable oils and oil seeds, raw cotton, coffee rubber, &c. It is most improbable that imports will be sufficient to balance exports. Either, therefore, export must be restricted, or the exports must be financed *i.e.*, they must be paid for in money. The ordinary way of doing this is by sale of Council bills in London for British money, these bills being cashable in India in rupees. When Council bills are issued in excess of the amount raised by taxation in India to meet home charges, additional rupees have to be paid out of the Treasury, and this involves, sooner or later, more coining of rupees. Since January 1, 1916, India has coined 1,300,000,000 silver rupees, besides greatly inflating the paper currency, and has absorbed much more silver than all the mines of the world have produced in the same period. This process is still going on, and is forcing up the price of silver, which already is so high that it costs 2s. to coin a rupee. A free flow of exports of the Indian produce which is becoming available, and which is so badly wanted in England and elsewhere, therefore under present arrangements inevitably forces up the exchange value of the rupee—*i.e.*, forces down the exchange value of British currency.

If my proposal be adopted this further rise in the rupee will be prevented, and the superfluous financial strength of India, created by its almost complete abstinence (not the fault of Indians) from the efforts and sacrifices of the war, will come to the aid of the present financial weakness of the United Kingdom. The absorption of only a moderate number of currency notes in India will put up their value and speedily bring the American exchange to par, and also prepare the way to convertibility of currency notes into gold. I must however emphasize the point that there must not be any expansion of the currency note issue is consequence of the adoption of my proposal. If there were, the disease would only be spread instead of being cured.

It may be asked whether if the Indian exchange *can thus be stabilized, why not stabilize it at the* pre-war rate of 1s. 4d. (£1—15 rupees) instead of at the present, and also the old and long standing rate of 2s. (£1—10 rupees), by making the £1 currency note legal tender in India at Rs. 15. The answer is that to do so would involve a great rise in prices in India, prices already being so high as to cause acute distress among vast numbers of people, and a collapse of the present financial basis of Indian government. India is far less fitted to cope with violent fluctuations in the average price level than Western nations, and the attempt to stabilize the rupee by means which would greatly enhance prices would be disastrous.

*From the Indian point of view the chief considerations* are that with a fluctnating rupee international trade is a gamble, and the acceptance of appointments by Civil servants and others in India is also a gamble. India profited enormously by the stable rupee of the pre-war period, and badly needs a restabilization. This can only be obtained in one of the following ways ;—

(1) By my method of making British currency notes legal tender in India at the present rate of exchange.
(2) By making Indian paper money inconvertible and issuing it freely.
(3) By lowering the silver contens of the rupee.
(4) By prohibiting or heavily taxing Indian exports.
(5) By freely importing gold into India.

Of these alternatives (2) and (3) would be disastrous to India ; (4) an injury to India and a disaster to Great Britain ; (5) would drain away a practically unlimited quantity of gold into India and depreciate paper money in all the rest of the world. But (1) pools the financial strength of the Empire, and benefits all portions. It means cheaper food and more employment.

## BOOKS IN BRIEF.

**The Great Problems of British Statesmanship**—*By J. Ellis Barker—Second Edition John Murray, London, 12sh. net.*

This is a reprint of articles which originally appeared in the *Nineteenth Century and After.* The articles attracted very wide attention at the time of their publication and the fact that a first edition of the book was exhausted within two months of its publication shows that it has been rightly appreciated all over the world. The book is not however made up merely of the original articles published in the *Nineteenth Century and After*; these have been revised, brought up-to-date, and organically connected. In the opening chapter of the book, the reader who is axious to have a conveniently good summary of Mr. Barker's views will find a general outline of its contents. Mr. Barker's qualifications for issuing a book of this kind are set out by him in the preface to this book, but it is hardly necessary to those who are at all acquainted with his writings in the British press to quote them here. But one fact may be noted as showing how correct he was, in the pre-war days, of his estimate of German designs and aims. "Ever since 1900 when I began my career as a publicist" he says, "I have warned this country of the danger of a war with Germany. In all my books and in innumerable articles printed in the leading reviews and elsewhere I have urged unceasingly the necessity of diplomatic, military, and economic preparation, the necessity of abandoning the policy of 'splendid isolation' for one of alliances with France, Russia, Japan and the United States, the necessity of creating a national army the necessity of strengthening the British industries, and especially the iron and steel industry, by a policy of deliberate development, by a protective tariff, the necessity of vastly increasing agricultural production by peasant proprietorship and various other means, the necessity of developing the neglected railway and canal systems of Great Britain, the desirability of an Anglo-American reunion etc................It is a certain satisfaction that all the reforms which so many have urged in vain before the War seem likely to be carried out in consequence of it. The ways of Providence are wonderful. Iron is tried by fire and nations by war. A new and greater Britain is arising. The War may not only make the British Empire a reality, but bring about an Anglo-American reunion. The War, far from being an unmitigated evil, may prove a blessing to the British race." Mr. Barker's views and suggestions on foreign policy, on economic problems and on internal organization are worth careful study by all those in this country who desire to take an intelligent interest in the coming development of the British Empire. His chapter on the problem of Constantinople shews bow closely India was and is connected with the problem of Eastern Europe. It throws much fresh light on Napoleonic designs on India and Tipu's foolish dreams of driving the English out of India towards the close of the 18th century. Very suggestive, again, are the views of Mr. Barker in regard to the problems of Constantinople, Asiatic Turkey, Austria-Hungary, and Poland. In regard to Asiatic Turkey, he wants it to be neutralized, the Turks being under the political tutelage of Britain until they are fit to govern themselves. Many of Mr. Barker's suggestions in regard to British finance have been already adopted by the Government which speaks for itself. There are also chapters on "Anglo-American Reunion," "The German Emperor's position" etc. all of which show what careful thought Mr. Barker has brought to bear on his work. We would commend the book to all interested in current European problems as a safe guide.

**Instincts in Industry**—*By Ordway Tead, Published by Messrs. Constable & Co., London 6sh.*

So far as we are aware, this is the first book of its kind. Mr. Tead strikes virigin soil in it. His aim " throughout is *to establish an understanding point of view towards familiar activities in the industrial world*—a point of view which construes human behaviour as having an organic relation to the human nervous system and its environment, past and present." As Mr. Tead puts it "the book is an effort toward a better understanding of people in their capacity as manual workers" Mr. Tead cannot have put his aim in writing the book better. Since the time of Karl Marx the protest has gone forth that the working man is not merely an element in production but a *human being*. In no book that we have read in recent times has the protest been analised better—for it is done scientifically—than in Mr. Tead's book. It ought to form a distinct addition to the few really standard works we have on the subject, on which Mr. Tead has written with so much knowledge and precision.

**Karl Marx—The Man and His Work.** *By Karl Dannerberg, Published by the "Radical Review" Publishing Association, New York, Thirty Cents.*

This is a reprint of three lectures and two essays which originally appeared in the *Radical Review*. The lectures and the essays together give a complete picture of Karl Marx and his work. Their chief merit is that they give in very brief compass what can only be gathered after a laborious study of Marx. The intellectual sympathy which Karl Danneberg bears to Karl Marx is so great that the picture he draws is one that does not lack reality. The study of Marxism which the author gives in the first of the two essays deserves special commendation.

**In-come Tax.—How to avoid over charges and obtain repayments.** *By A. D. Macmillan, formerly Surveyor of Taxes. Published by Eppingham Wilson, 54 Threadneedle Street, London E C 2.*

Mr. Macmillan deserves thanks for the practical shape he has given his little book. It is not so much a book on Income-tax as one which will serve the needs of every man and woman who has to pay Income-tax, but hasnot the services of expert accountants and law-yers at their command.

## ACKNOWLEDGMENTS.

**The Agricultural Development of Baluchistan.** *By Albert Howard, C. I. E., M. A., Imperial Economic Botanist, and Gabrielle L. C. Howard, M. A., Second Imperial Economic Botanist Calcutta, 1919.*

**Report on the Operations of the Department of Agriculture, Bengal** *for the year 1918-19. Calcutta, 1919. Price-Indian, Rs.2; English, 3s.*